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IN THIS ISSUE

Mud Conditioning Important Drilling Factor 3

C.N.G.A. Elects 1940-41 Officers and Directors 15

C.N.G.A. June Frolic Pictures 16-22

Purchasing Personalities 26

Laugh This Off 27

San Joaquin Valley Development 28

Los Angeles Basin Development 31

Coastal District Development 35

Crude Oil Production 40

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Mud Conditioning is an Important Factor

In California Drilling

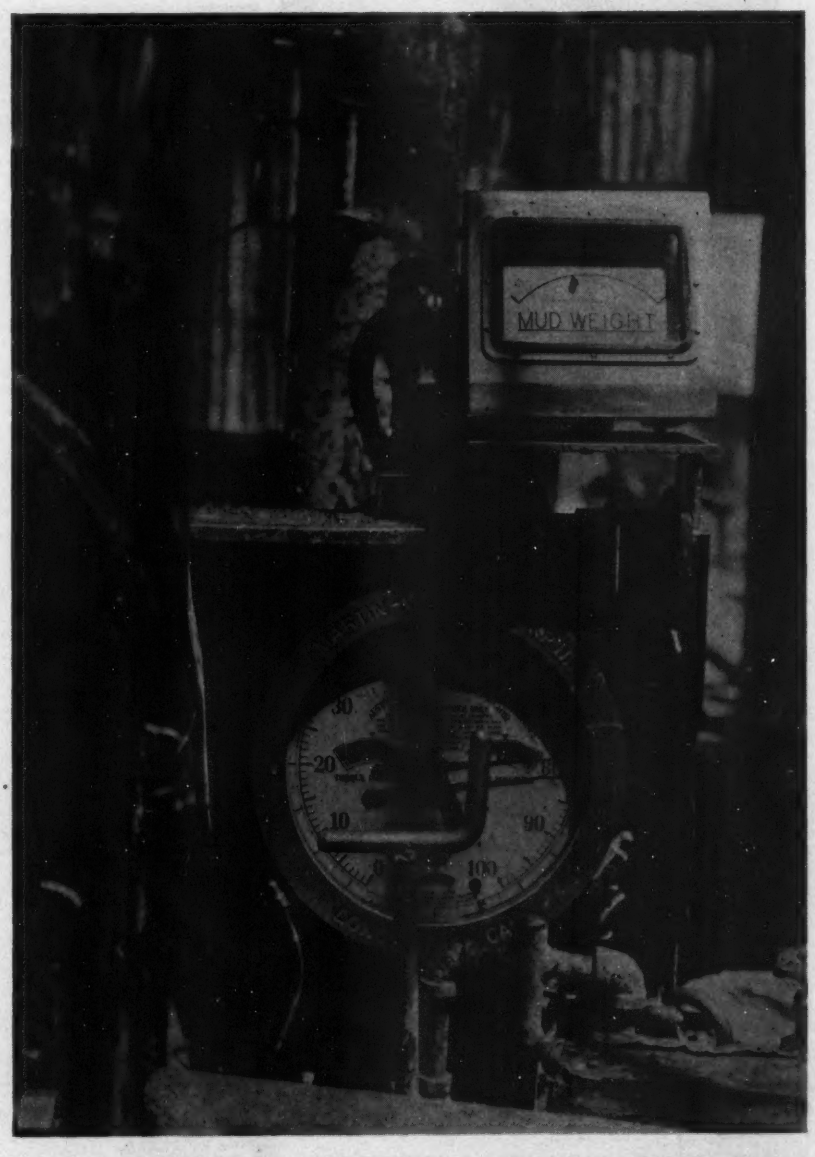
By Wallace A. Sawdon
Petroleum Engineer, Los Angeles

An experienced driller of the "old timer" type in one of the deep San Joaquin Valley fields of California recently remarked, "If we hadn't kept our mud just right we never would have drilled this field." The technical advance in mud control is thus widely recognized and the building of the proper mud and its continuous conditioning is quite generally considered as a vital factor in present day drilling technique. Mud fluid as now used has naturally not reached the ideal and there are cases where it is still allowed to go "haywire" and cause a great deal of trouble. The science of mud control, however, has advanced rapidly during the past few years and has made a definite contribution to the successful completion of wells of all depths.

While the primary function of a drilling fluid is to remove the cuttings from the well efficiently, it must perform other duties to meet the requirements of modern rotary drilling. To hold the cuttings the mud must keep them in suspension and prevent their settling when circulation is stopped. Yet consideration must be given to settling out of any fine inert matter such as sand which passes through the screen after the mud has been returned to the surface. The weight of mud must be controlled since it must exert a hydrostatic pressure sufficient to overcome any formation pressure encountered. Of great importance also is the wall-building qualities and prevention of water loss. The mud should further be able to consolidate loose formations and prevent caving. Then, too, it must act as a lubricant and be noncorrosive. In specific cases it may have to aid in controlling heaving shale and assist to the greatest extent possible in overcoming lost circulation.

Such is an ideal mud; but one ideal mud mix cannot be realized for every well or even for the entire drilling of many individual wells. Greater attention must be paid to certain qualities under some drilling conditions and to others under different conditions. When the relative value of the different characteristics is determined for the formations being drilled, the mud fluid can be kept in condition to meet the requirements. This control may be secured by physical, chemical or mechanical means but in most cases it demands more than one.

The basic clay from which the mud is made should be tested and evaluated. The mixture can then be conditioned to provide the necessary properties from the start. The hole will naturally make mud as it is drilled. In some cases this will be advantageous to conditioning; in others it may be detrimental. In



The electrical continuous mud weight indicator is mounted at the driller's position as here shown or at the ditch. Usually one indicator is placed at each location.

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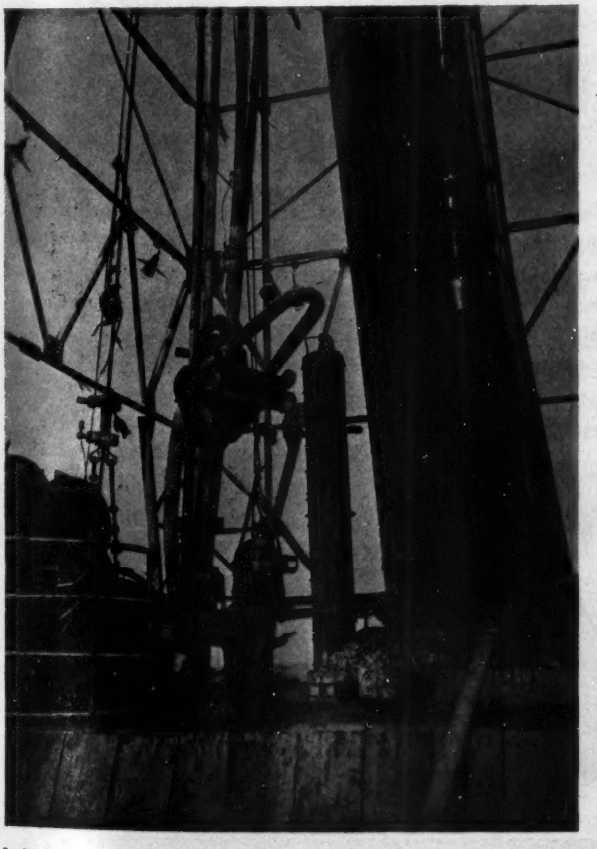
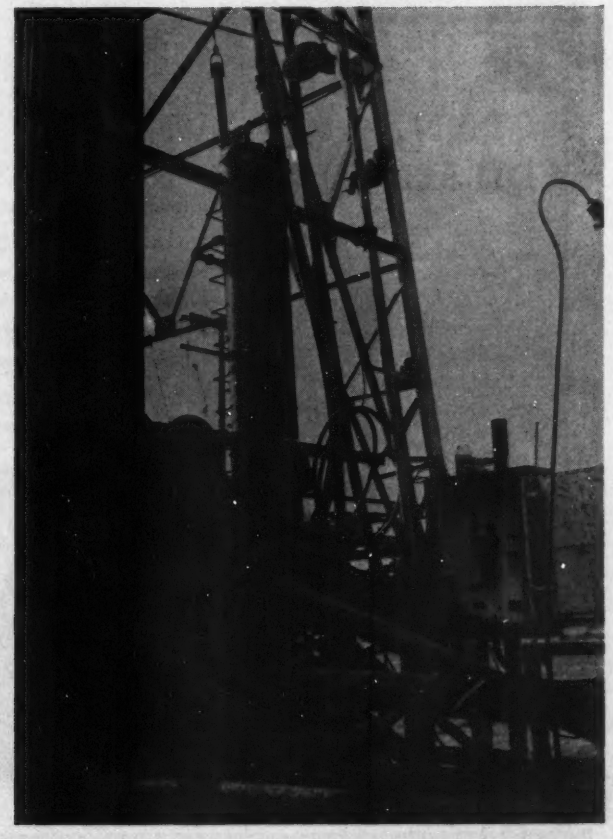
many deep fields of California the basic mud fluid does not have to be changed during the entire drilling of the well; but its various characteristics, such as weight, colloidal properties or viscosity, may have to be altered considerably before the hole is completed. There are many factors to influence the mud during drilling but with a knowledge of these factors and a clear understanding of the qualities the mud should possess at the time it is being used there is reason to believe that it can be kept in a condition that will provide the necessary qualities at all times.

The colloidal properties of the mud are of first importance since all other qualities, even the weight, are related in some degree to the colloidal condition of the fluid. (1) It is the presence of colloids in the drilling fluid that holds the cuttings in suspension and causes them to flow up the well with the circulating fluid. Colloids provide thixotropy which is that property of a mud fluid which causes it to gel when not in motion and to become liquid upon agitation, the transformation from one state to the other being repeated as long as thixotropy continues. On the colloidal content of the mud also depends the thickness of wall cake formed and the rate of water loss.

Some clays from which the mud is made are deficient in colloids and colloidal material must then be added, usually in the form of a prepared bentonite. During drilling, the formations penetrated will sometimes rob the mud of colloids and necessitate additions to keep it to its required thixotropic condition; in other wells, as when going through a bentonitic stratum, colloids may be supplied to the mud as it circulates and will make necessary a reduction of colloidal action. In the latter case, an increased viscosity is evident but it must be remembered that a high viscosity may occur from a high content of inert particles even with mud that may be lacking in colloidal properties. A viscosity test, while of importance when used with other mud data, may be misleading if considered alone.

The necessity for testing the mud fluid at regular periods is now recognized by most California operators. Testing equipment and facilities for testing the mud are being provided at the well and field testing, although frequently augmented by laboratory analyses, is largely used for keeping the mud fluid in condition. The A.P.I. has established a code on "Standard Field Procedure for Testing Drilling Fluids" which, although now in the process of being revised in some of its details, is the basis of the following brief summary of field testing procedure.





Left: This type of degasser is frequently used on wells in California. Variations in the design are made to suit the operator's purpose. Right length slots in the two sections of pipe enclosed in the metal cylinder of this degasser discharges the mud fluid in two sheets.

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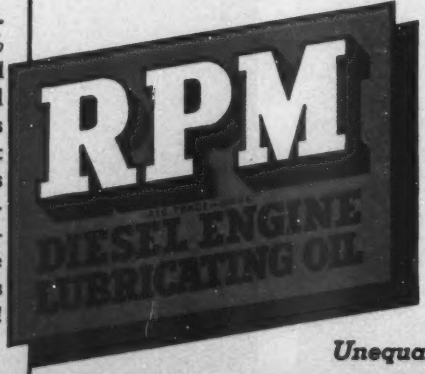

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Density: The weight of the mud may be determined with hydrometer, mud balance or bucket and spring balance. In California the trend is toward the use of the mud balance which is usually graduated in both the A.P.I. density scale of "pounds per square inch per 100 feet of depth" and pounds per cubic foot.

Viscosity: Measured with the Marsh Funnel, 1500 cc. in and one quart (946 cc.) out. Many companies in California are still using the method of 500 cc. in and out and the viscosity ranges mentioned later are based on this method of determination. There is a tendency, however, to use the Stormer Viscosimeter and with it making determinations for both viscosity and gel strength.

Sand Content: Use of elutriation method with constant head. The content is reported as per cent by volume of approximately plus 200 mesh sand.

Wall Building Test: A filter press is used with 600 cc. of mud and a pressure of 100 lb. per sq. in. applied. At this pressure the cake thickness is determined to the nearest 1-32 in. and the water loss measured in cc. for a 30 min. run with a filtering area (using filter paper) of seven sq. in. The temperature of the mud before test is reported as the temperature of the run.

Hydrogen-ion Determination: Either the calorimetric or electrometric method is employed to determine the pH value of the mud. The pH testing equipment is largely used in the field laboratory but is also carried around by mud engineers.

Shear Strength: A simple "Shearometer" has been tentatively approved by the A.P.I. for testing the shear or gel strength of muds. The results are given in pounds per 100 square feet as determined by a first reading taken after 5 minutes of agitation and a second reading after a period of quiescence, usually ten minutes. As noted above, gel strength determinations are also being made with the Stormer Viscosimeter which is becoming considered a field instrument.

Note the convenient location of this sink for conducting mud tests. The mud ditch is under the steel flooring on the right.

The salt content of the fluid is also being tested and such tests are particularly important in the deeper wells since they assist in the chemical treatment of the mud. The tests are usually made in the laboratory, however, by titration with silver nitrate (A_gNO_3). The salt content is expressed in grains per gallon of sodium chloride.

Mud Density

The weight of the mud must naturally be closely controlled when it is relied upon to overcome formation pressures. The mud weights being used in California have been discussed in a previous article (2) which also gives a graph for determination of the hydrostatic pressure exerted by muds of different weights at depths up to 20,000 feet.

The necessary weight above that provided by the clay used for making the mud fluid or by the formations penetrated which may add to the weight of the fluid as the well is being drilled is secured by the addition of weight material. The weight material widely used in California is either prepared from barytes or from an amorphous iron oxide. Either of these weight admixtures will supply the maximum weight required for any pressure and are usually made up with sufficient colloidal material to provide for their suspension in the drilling fluid. In case of highly colloidal mud, however, the heavy inert solids without a suspending material content are employed.

The addition of limestone is practiced by some operators. While the carbonate mud thus formed adds weight to a limited extent it provides for the use of an acid in removing a mud cake from a producing sand, for disintegrating the mud preparatory to cementing and thus getting a better bond for the cement and for loosening stuck tools or drill pipe.

The reduction of weight is done by thinning the mud fluid. This thinning may be accomplished by the mere addition of water but in so doing it must be assured that the resulting fluid is not weakened in its other qualities. A test before thinning will determine whether water alone can be added or whether other treatment will be necessary. Such treatment may require the addition of colloidal material, the removal of inert solids or the use of a deflocculating agent in addition to

the dilution. The fact that these various treatments produce different effects indicates the necessity of knowing the character of the mud so that the wrong treatment will not exaggerate an undesirable condition.

Gas-cutting is, of course, a frequent reducer of weight and obviously lightens the mud when a light mud is most hazardous. Vibrating screens have proved of considerable value in knocking the gas from the mud as well as removing the solid matter from the stream. Most wells to be drilled to any considerable depth are now being equipped with two vibrating or shaker screens and the general practice is to place these screens over a settling pit or above a steel tank serving as intake for the mud pumps as well as for settling out fine inert matter.

When much gas is encountered some form of degasser is generally used, several types of which are shown in the accompanying illustrations. The simplest type is probably the inclined baffle trough which consists of a series of steps over which the gas-cut mud flows by gravity after being pumped to the top. It has been found that a considerable amount of sand frequently drops out of the mud during its passage down the steps and this settling action may be of greater value in conditioning the mud than is generally realized.

A recent design of degasser consists of two 3-ft. sections of 3-in. pipe made up in parallel with mud supplied to each pipe by a manifold at one end. Each section of pipe is closed at the other end and the mud fluid is forced through slots cut the full length of the pipes which cause the discharge to flow in sheets when it leaves the slots. The pipes are about 6 in. apart with the slots placed opposite each other so as to make the two sheets of mud fluid meet. The degasser may be placed in a vertical or horizontal position or at an angle and the pipes are housed in a cylindrical sheet-iron chamber to eliminate as much air as possible.

Mud that went into one well at 79 lb. per cu. ft. and came out gas-cut to 64 lb. per cu. ft. has been restored to approximately its original weight by being degassed with this device. The mud is pumped through with an auxiliary pump at a pressure of 150 lb. per sq. in. and falls into the ditch leading to the suction pit, ready for circulation.

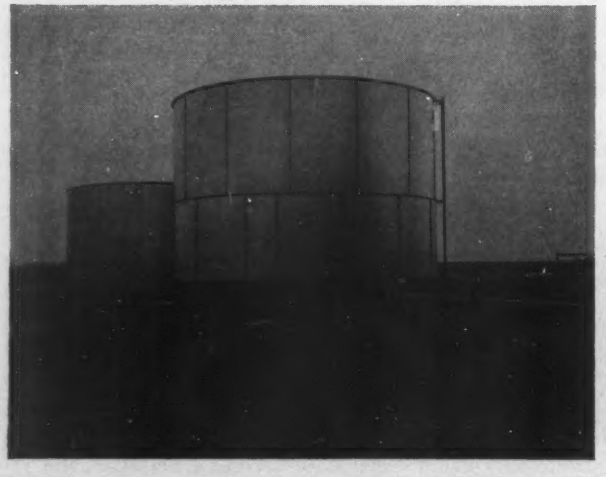
A refinement of this design has recently been installed on a well in the Rio Bravo field. It consists of four sections of pipe with the slots equipped with rubber lips that are adjustable. The fluid sheets from all four pipes are directed toward a common line of intersection so that they will impinge on each other. This degasser can, however, be made with four, two or even one pipe.

Another type of degasser of recent design consists of a cylindrical chamber 15 ft. in height by 20 in. diameter in which are a number of baffles and nozzles. Where this degasser has been used it has been set up in a corner of the derrick. The mud fluid is pumped into the top and discharged from the bottom. A vacuum is carried in the cylinder and the mud fluid forced through the jets and over the baffles is degassed in this vacuum which reduces the oxygen content of the fluid, or at least prevents an absorption which might take place if the operation were in open air. This device has been found not only to restore the density of the fluid but also to reduce the viscosity which had been raised during its circulation.

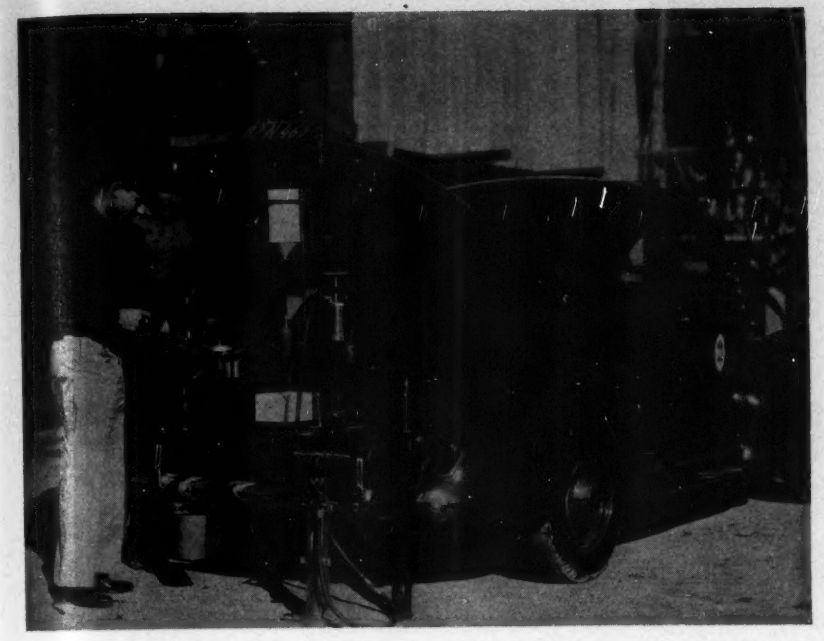
Colloidal Properties

The colloidal content of the mud fluid is the principal factor in determining the quality of the mud, the matter of weight being excepted although the heavy inert substances depend on colloids to hold them in suspension and the gas entrapped in the mud reducing its weight is held by colloidal action. By the addition or reduction of colloids, by their deflocculation or by a control of colloidal action, the mud is kept in the condition that will best meet drilling requirements.

The mud sheath or filter cake



Left: Two mud storage tanks are used for mud fluid supply on this well. The rectangular tank in front also contains treated mud. Right: The most recent design in degassing is here shown. Rubber sections of pipe provide unpinging sheets of mud. The cover can be seen to the right and slides over the degasser when in service.



Traveling laboratories like this provide for making complete tests of mud at the well.

formed on the wall of the hole depends directly on the colloidal condition of the mud fluid. The water loss is of chief consideration and a highly colloidal mud will quickly deposit a thin cake that will reduce to a negligible amount further passage of water through it. This cake is formed by the minute colloidal solids forming on the wall when water has been pressed out of them; and the thinness of the cake depends on how rapidly the solids make a nearly impervious mass on the formation.

It is evident, therefore, that the formation of the cake depends on passage of water into the formation and that an impervious shale could not be coated with a filter cake. A loose sand, on the contrary, will take water easily but if the mud is highly colloidal the cake formed will be almost impervious to further passage of water through it even while it is very thin. A good mud should thus form a water sealing sheath on a sand or other porous formation before it becomes very thick and so reduce water loss to the minimum.

Cake thickness is increased by a deficiency of colloids or by the presence of non-colloidal matter which may be a content of the original clay or of sand or other inert particles picked up by the mud during drilling. A mud may be in such a condition that an effective cake may never form and a water loss continue to occur throughout drilling operations in spite of a thick cake that may be built up on the formation.

It would appear that no cake would form on the walls of the hole while drilling in an impervious formation such as some shales since there is no outlet for the water. Actually a cake may form on such a formation due to a wetted surface, the hydrostatic pressure or the drill pipe hammering on the wall of the hole. If no actual cake forms there is probably a gel coating on the walls when a highly thixotropic mud is used under conditions which permit sufficient quiescence along the perimeter of the hole.

One of the major oil companies in California has been using flake mica in mud to reduce water loss from the mud into highly permeable sands. It is most widely used, however, with non-fractured or very porous formations and to overcome a mild loss of circulation. The mica flakes range in size from 3-16-in. across down to 1-64-in. but a mixture of different sizes is necessary. The mica apparently becomes entrained on the mud cake even after the cake is formed and thus gradually disappears from the fluid. When vibrating screens are used it is necessary to by-pass them for a short time after the mica is added since the larger flakes not passing the screen would be lost or broken to smaller size. Sand in the mud will settle out but the mica will not.

The thixotropic properties of the mud which are dependent solely on the colloidal condition of the fluid are naturally directly related to the wall-building qualities. Each is usually indicative of the other but it is only by testing each separately that the degree of effectiveness can be determined. Tests to determine the effect of temperature, pressure and viscosity on the filter cake propensities of different muds show the superiority of mud fluids with strong thixotropic properties. (3).

The thixotropy of the mud has become of ever increasing importance with deep drilling since on it not only lies most of the responsibility of bringing up the cuttings but also the full duty of holding cuttings, weight material and other inert solids in suspension when the tools are out of the hole and circulation stopped. The measure of thixotropy is the difference in gel strength at the immediate cessation of agitation and that after a period of quiescence. It is not specifically indicated by the viscosity although an increase in thixotropy is ordinarily accompanied by a rise in viscosity.

The viscosity range for good drilling muds is probably between 25 and 50 seconds as measured by the Marsh funnel using 500 cc. in and out. Most operators feel that the viscosity should be kept between 26 and 35 seconds but some with good gel strength may be satisfactory up to 50 seconds. With such viscosity the gel strength test is particularly important to make sure that the desired thixotropy accompanies the viscosity and that the

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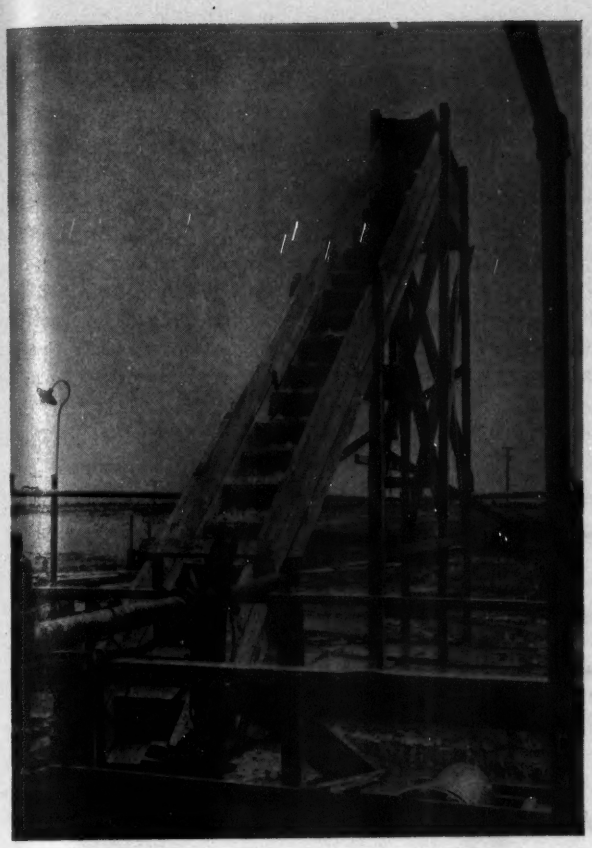

Left: To the rear is a recently designed degasser, 15 ft. in height, in which is carried a vacuum. Right: The cabinet here shown is completely provided with equipment for field testing of mud fluid, part of the equipment being in service when the picture was taken.

high viscosity is not caused by some deleterious factor. By tests (3) it has been indicated that an increase in viscosity due to increase in non-colloidal material had little apparent effect on the filter cake or water loss of a thixotropic mud but does increase the cake thickness of muds weak in thixotropy. As remarked before, a high viscosity may result from a concentration of inert matter and not from the colloidal content of the fluid.

The effect of temperature on the mud is becoming more important with the deeper drilling being done in many fields. High temperatures evidently increase water loss with any mud but the amount and rate seem to vary widely with muds made from different kinds of clay. (4) The water when hot becomes more penetrating and the rate of flow is faster. This, of course, holds true for any mud; however, some muds undergo a physical change when heated which accounts for an increased water loss and cake thickness. Here again tests (3) show the advantage of a thixotropic mud since a fluid with strong thixotropy when heated forms a thinner cake and shows considerably less water loss than muds with even moderately strong thixotropy. As to the effect of temperature on thixotropy itself, Dr. Hauser (1) states that hydration is increased by high temperature and that the mud will gel faster than at low temperature. The viscosity of most muds decreases with increase of temperature to a certain degree and then starts to increase. (5) The temperature at which minimum viscosity is reached varies over a wide range for different muds. It appears that tests for viscosity, gel strength and wall-building properties should all be made at the operating temperature if accurate determinations are to be secured.

It is quite evident that some pressure is necessary to cause the passage of water from the mud into the formation to form the filter cake, but there seems to be some difference in wall-building qualities of different muds with increase of differential pressure. Tests on fluid consisting entirely of prepared bentonite and water have shown no change in cake thickness or water loss above 100 pounds but muds made with a native clay base even with the addition of colloidal material will probably not reach such an effective condition. The wall-building test for field work is specified at 100 pounds and while the effect of pressure will usually continue beyond that range, the results secured from a 100-lb. test are generally indicative of the wall-building qualities of the mud. Field testing apparatus utilizing higher pressures is frequently used and tests made in the laboratory can generally be

conducted at ever greater pressures. By comparing tests made at 100, 250 and 500 pounds the performance beyond those pressures can be determined to some extent although after reaching one or two thousand pounds the effects of greater pressure on some muds decrease.

Since many properties of the colloids contained in drilling muds are closely related to the pH value of the colloidal system, the measurement of the pH value or hydrogen-ion concentration frequently provides a means of detecting changes in the acidity or alkalinity of the fluid. Closely related to the hydrogen-ion concentration are not only the thixotropy, gel strength and viscosity but also the corrosive and gas-absorption properties of the mud. A mud with a low pH is on the acid side and is apt to be corrosive to the metal equipment with which it comes in contact; one with a high pH may be flocculated. When a mud suddenly changes its properties the clue as to the contaminating influence may be found by a pH determination.

Normal protection against corrosion and abrasion is provided by the lubricating property of the colloids which envelop the cuttings, sand and other matter picked up by the drilling fluid. While this feature of the mud may retard the settling out of the minute particles in the returns, the vibrating screens now in general use cause a violent agitation which releases the fine solids to a satisfactory extent under most conditions. The degassing equipment that is installed where the mud becomes badly gas-cut also aids in knocking out fine inert matter.

Chemical Treatment

It is only during the past few years that chemistry has been applied extensively to the conditioning of mud fluid. A great deal of experimental work preceded the more general use of chemicals to keep the mud in proper condition but the value of chemical treatment is now recognized. This does not mean that further advancement in this science will not be made for the experimental work is being carried on continuously by the oil companies. Moreover, it must be remembered that chemical treatment does not add to or take from the colloidal content of the mud fluid; it controls the action of the colloids in the fluid and causes them to be more effective after being at least somewhat flocculated. A mud deficient in colloids still needs their addition; and a mud too highly colloidal must still be thinned to reduce the colloid concentration in order to satisfy viscosity and gel strength requirements. The determination of the proper concentration of colloids to meet the particular requirements of the drilling operation is thus assumed. The chemical treatment can then, when necessary, condition the mud to keep the colloids functioning.

The widest present application of chemical treatment in California is to deflocculate the mud or reduce

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☆ FEWER WEARING PARTS
☆ GREATER CAPACITY

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its viscosity. Defining flocculation, W. W. Robinson (6) says that "for practical purposes the colloids in a mud may be thought of as small particles which can either adhere together in bunches, or 'flocs', or be scattered (dispersed) through the mud comparatively free from each other. When the colloids are bunched together in flocs it is said to be flocculated, although the term flocculation does not define degree. If some agent is added to the mud which will coat the colloids by 'surface adsorption' and loose the cohesive hold they have on each other the flocs will break up and the mud is said to be deflocculated although the term does not define degree."

Some of the more important chemicals that have received practical application as deflocculants are listed with brief descriptions by Mr. Robinson. Among these, one that is widely used in California is tetra-sodium pyrophosphate. This is one of the complex phosphates and has a very high alkalinity. It is more stable in hot muds than the other complex phosphates and is extensively used in the deep San Joaquin Valley fields. While the proportions for use naturally vary with the mud and hole conditions influencing the mud fluid, an average employed in the Rio Bravo field, for instance, is approximately 1 pound per foot of depth. If an excessive amount of the chemical is used the accumulative effect may be detrimental to the mud fluid and the high alkalinity will have to be corrected.

This chemical is used to deflocculate the mud and allows the hole to make fluid. A bentonitic formation in the Rio Bravo field supplies plenty of colloidal material to the mud made by drilling but in many places the opposite effect is true. By deflocculation the wall-building qualities of the mud are improved and the viscosity more easily controlled. The flocculated material caused by salts from the formation are re-dispersed and shale solid picked up while making hole are separated.

Another complex phosphate being used is sodium tetra-phosphate. This chemical is not as alkaline as the pyrophosphate and an over-treatment is not as harmful to the mud. It has been found effective on muds previously treated and on those contaminated with salt.

Tannic acid (quebracho or chestnut extract) has been used to some extent as a deflocculating agent and is found under certain conditions not only to give a thinning effect but also to help stabilize the colloidal material in the mud. Sodium silicate has also been employed alone for deflocculation but since large amounts are likely to cause flocculation, it is more widely used with other chemicals and especially with quebracho. The actual form in which the tannic acid is used is generally a sodium tannate resulting by neutralizing it with caustic soda (sodium hydroxide).

The judicious use of chemicals is naturally demanded. Not only does an excess of chemical treatment increase the cost of the treatment but it may result in harming the mud fluid. For example, when drilling a fine sand which puts minute inert solids into the mud stream, chemicals are added but the solid content may increase. Finally the mud, which is deflocculated by or still partially flocculated after the treatment, will contain a high content of solids which are not responsive to further treatment. The viscosity becomes excessive and cannot be reduced. This high viscosity results from a high percentage of solids by volume and not percentage by weight. It will then probably be necessary to dilute the mud with water to reduce the per cent of solids by volume and add weight material to give the fluid its proper specific gravity. In some cases more collodial material will have to be mixed with the mud.

In addition to the use of an especially prepared admixture for use in mud while drilling out cement, both soda ash (sodium carbonate) and sodium bi-carbonate have been found effective in treating cement-cut mud.

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ATTENTION

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July Meeting

will be held

JULY 12

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Papers on

Hazards

Safety

Personnel

DINNER 6 p. m.

MEETING 7:30 p. m.

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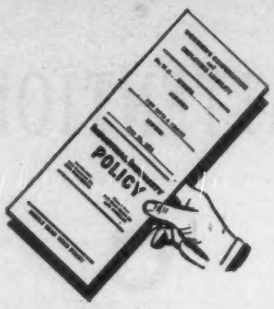

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Other chemicals than those here mentioned are, of course, used for mud treatment but, except for rather limited purposes, have a greater application in fields outside of California. Heaving shale, for example, is not prevalent in the California fields and the conditioning of mud for overcoming heaving shale is seldom necessary here. Moreover, other chemicals not yet applied may some day increase the effectiveness of chemical treatment of mud fluid. A greater understanding of collodial chemistry and its practical application to drilling mud may lead to even simpler treatment than at present.

Mixing the Mud

Each operator has definite ideas as to the best arrangement for mixing and storing the mud fluid. It has become the custom with many, however, to erect one or two steel tanks (frequently 1000 bbl. capacity) wherein a supply of properly conditioned mud is kept ready for use at all times. In some cases one tank is elevated to provide gravity flow of the mud fluid to the suction pit.

Small individual pits or tanks provide for introduction of admixtures and chemicals with an auxiliary pump generally available for this service. The same pump, however, serves for other mud handling operations as a rule and even one of the circulating pumps is often so connected as to handle the mud supply when it is not otherwise in use. Some type of mud mixing gun is widely used for preparing the mud fluid and for keeping the mud thoroughly mixed when being treated. On many wells several of these guns are installed.

Central mud plants are in use in a few California fields. At these plants the reclamation of weight material after de-sanding by centrifugal separators is a feature. Mud conditioned at the central plant goes to the well where it is utilized as new mud and subject to conditioning while there employed.

Mud testing equipment is set up at some convenient location where samples can be grabbed with ease as shown in the accompanying photographs. Some companies have all field tests performed by their own engineers with equipment stationed at the well. Others have test cars which they send to the well for test purposes. Still other companies make the simpler weight and viscosity tests at the well but employ a service test car for all other field tests. A new electrical instrument for continuous indication of mud density has recently been introduced. This should facilitate control of weight.

(1) *The application of collodial chemistry to drilling mud is discussed comprehensively in the "Proceedings of the 1939 Collodial Symposium" conducted at the University of Oklahoma by Dr. Ernest A. Hauser of the Massachusetts Institute of Technology. The importance of colloids and their function in mud fluid are here emphasized.*

(2) *"Control and Safety Equipment for Drilling Wells," California Oil World, Second Issue, May,* 1940.

(3) *"Evaluation of Rotary-Drilling Muds" by P. H. Jones and E. C. Babson, A.P.I. Drilling and Production Practice,* 1936.

(4) *"Effect of Temperature on Plastering Properties and Viscosity of Rotary Drilling Muds", by H. T. Byck, A.I.M.E. Technical Publication No.* 1116.

(5) *"Effects of Temperature on the Viscosity of Some Gulf Coast Drilling Muds" by B. C. Craft and J. D. Exner, A.I.M.E. Petroleum Development and Technology,* 1933.

(6) *"The Application of Chemicals to Drilling and Producing Operations" by W. W. Robinson, presented at Spring Meeting, A.P.I. Division of Production, Los Angeles, March* 19, 1940.

Axelson Mfg. at San Francisco Fair

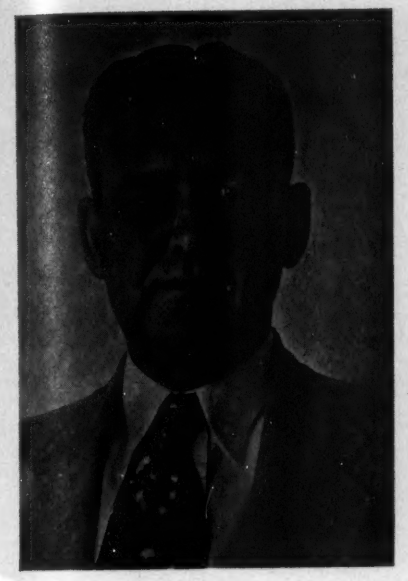
In 1940 the Axelson Manufacturing Co. is participating in two educational exhibits designed to acquaint the public with the problems of oil production. One exhibit is that placed in the Vacationland Building at Treasure Island, San Francisco. An actual operating model of an Axelson Deep Well Plunger Pump of the top-lock rod type with gas anchor has been installed in the petroleum exhibit which is presided over by A. Ray Banks. In operation the pump actually separates gas from oil and a little surface compressor pump adds gas to the oil for this purpose.

The same type of exhibit has been installed at the Museum of Science and Industry in Chicago. This exhibit is of a permanent nature and is a project of Julius Rosenwald. It is said that this Museum of Science and Industry is second to none in the world today and covers acres of space devoted to agriculture, textiles, metallurgy and aviation. Physics, chemistry, medicine and automotive engineering are also included.

California Natural Gasoline Association

Elects Officers and Directors for Year 1940-41

The newly-elected officers and directors of the California Natural Gasoline Association for the fiscal year beginning July 1, 1940 are: President, L. V. Cassaday, Lomita Gasoline Corp.; vice-president, W. C. Dayhuff, Standard Oil Co. of Calif.; secretary-treasurer, George L. Tyler, (reappointment subject to confirmation of directors in July).



L. V. Cassaday

Walter Dayhuff

Taft Chapter Chairman-elect C. S. Beard, C. C. M. O. Co., is also ex officio a director of the Association.

The Annual June Frolic of the Association was held June 8 at Riviera Country Club with an attendance of over 450. The spacious grounds and clubhouse facilities were splendidly adapted to the day of sports, both indoor and outdoor, and the large turn-out was gratifying to the hard-working committeemen who efficiently functioned under the direction of Harry Fiske, entertainment committee chairman.

The golf tournament, under the direction of George Christen, went smoothly with 122 players participating in three flights with golf ball prizes going to the low net and low gross in each flight. To Earle Gard went the prize for both low net and low gross in his flight. The blind bogey finished with seven players tied for the money which was divided equally among them.

Baseball, badminton and horseshoes proved very popular as did volleyball which was something new to Frolic activities of recent years. The "Majors" blitzkrieged the "Independents" in baseball while the Swiss Band poured out lively music in a return engagement.

Late afternoon found many of the sports participants freshened up and enjoying themselves in the game room until dinner time when a satisfying dinner was served none too soon. Following dinner, retiring president P. S. Magruder announced the officers for the coming year and thanked the members of the various committees for their hard work and cooperation during his term of office. The awarding of golf and door prizes was followed by a variety show which was well received. All in all, the event marked the close of a year of considerable accomplishment as evidenced by two published standards bulletins and a large amount of work completed on other technical problems.

List of directors of the California Natural Gasoline Association for 1940-41.

M. L. Arnold, Richfield Oil Corp.; A. H. Bell, Continental Oil Co.; A. H. Bradford, West Coast Refining Co.; J. C. Burks, O. C. Field Gasoline Corp.; J. A. Campbell; L. V. Cassaday, Lomita Gasoline Corp.; C. E. Coleston, Belridge Oil Co.; F. J. Colton, Tide Water Associated Oil Co.; F. E. Coyle, Tide Water Associated Oil Co.; F. E. Davie, Shell Oil Co., Inc., and Earl Derby, Standard Oil Co. of Calif.

H. L. Eggleston, Gilmore Oil Co.; O. C. Field, O. C. Field Gasoline Corp.; Harry Fiske, Ingersoll-Rand Co.; J. S. Fluor, Jr., Fluor Corp.; M. L. Fort, Industrial Fuel Supply Co.; C. D. Gard, Union Oil Co. of Calif.; R. D. Gibbs, Union Oil Co. of Calif.; J. C. Gilbert, Barnsdall Oil Co.; R. H. Green, Signal Oil and Gas Co.; R. W. Heath, Signal Oil and Gas Co.; W. A. Kirk, California Southern Oil Co.; W. H. Kraft, Honolulu Oil Corp., Ltd., and H. R. Linhoff, Richfield Oil Corp.

F. A. E. Lowell, Del Rey Oil & Gas Co.; A. C. Lyles, Kettleman North Dome Assn.; R. S. Lytle, Los Nietos Prod. & Ref. Co.; S. F. Magor, Superior Oil Co.; P. S. Magruder, General Pet. Corp.; G. C. McLaren, Standard Oil Co. of Cal.; Wm. Moeller, Jr., Southern Calif. Gas Co.; H. E. Moulton, C. C. M. O. Co.; N. H. Mull, The Texas Co.; H. M. Paulsen, The Bankline-Norwalk Co.; W. W. Robinson, Jr., The Texas Co.; John Rogers, The Cooper-Bessemer Corp.; W. D. Smith, Wilshire Oil Co.; T. L. Taggart, Standard Oil Co. of Calif.; R. S. Tulin, Shell Oil Co., Inc., and R. C. Wheeler, General Petroleum Corp.

The following letter was received by the editor:

"As retiring president of the California Natural Gasoline Association I wish to express the appreciation of the Association and myself for the facilities which you have offered us in connection with the publication of our monthly meeting proceedings, publicity work, etc.

"It is difficult to assign a tangible value to such a service but I feel personally that without your interest and the services of the California Oil World the past year of Association activities could not have been as successful.

"With kindest personal regards, I am,

Yours very truly,
(Signed) P. S. MAGRUDER,
President.

Van Acker Moves To New Address

Robert Van Acker, well known in Los Angeles oil circles for many years, has moved his office to suite 503, Stock Exchange Building. Affiliated with several successful independent companies in the past, Mr. Van Acker plans now to operate as an individual and has acquired properties in the Ojai area of Ventura county.

J. J. Delaney knocks it to pieces.

Harry, Earle and Cy.

Art Shaw.

Ted Sc

Earle Gard chips a putt.

1940

Harry Fiske and Chris Rector.

CNGA

W. L. Thrall a
Frank D. Smit

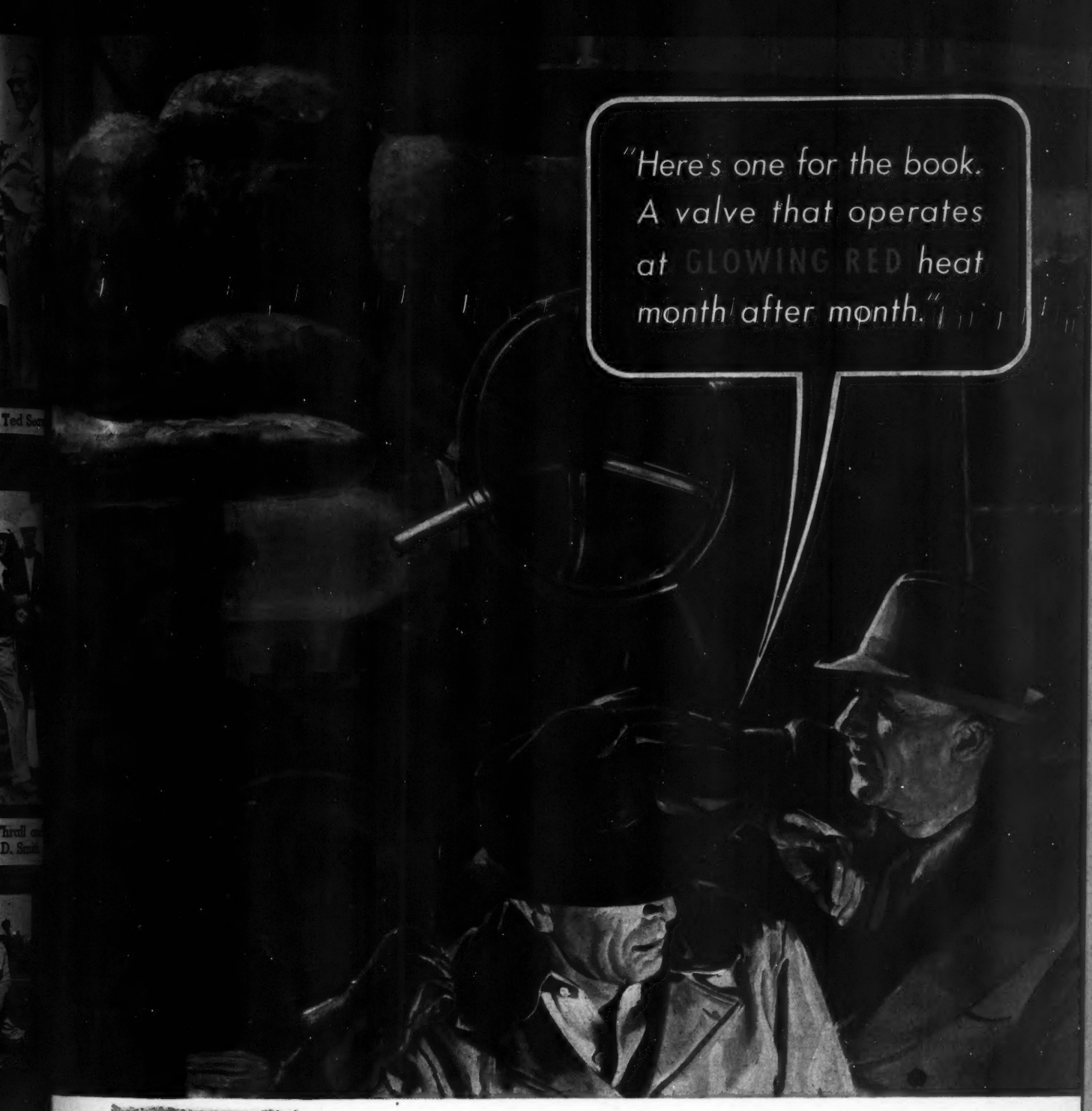
JUNE

FROLIC

Some form.

Coles Bason.

H. S. Armstrong, H. P.



950°

Stop kidding me! There's no lubricant that will operate in a red-hot valve at 950°," declared the visiting engineer. *But there it is!* In service for many months on a cracking line, in a refinery, this Nordstrom Hypreseal Valve has been making history. In many other refineries, operating topping units, this same type of valve is likewise rendering perfect service at temperatures of 675° F., without a leak; always easy to turn, even if carbon slugs settle in the line. There's no place in which any deposit can lodge. This amazing valve is made of special alloy; the body and plug are Merchromed; (patent pending). The plug is hot lapped at approximately the service temperature. The lubricant is a special compound developed by Nordstrom for this drastic temperature. Just more proof that Nordstrom Valves are truly engineered for the "toughest jobs." Keep upkeep down with Nordstroms.

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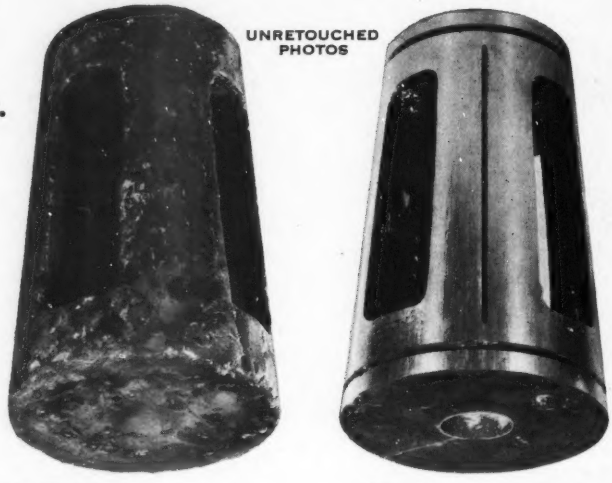

UNRETOUCHED PHOTOS

MERCHROMED PLUG ***in the rough*** **SAME PLUG** ***after machining***

NORDSTROM HYPRESEAL MULTIPORT, SHOWING MERCHROMED BODY

After Merchroming is completed in the body and on plug by special welding, the rough surfaces are ground or machined to final dimension; then the plug is "hot-lapped" into the body. Contacting surfaces have a low-friction, super-finish; intensely hard and perfectly fitted.

Again reflecting the initiative of Nordstrom engineers in offering the most advanced methods of valve manufacturing, *MERCHROMING* is presented. It is a process in which a special welded coating is applied to the rotating, frictional surfaces of the plug and its contacting body. Merchroming provides a coating of extreme hardness, corrosion-resistant, capable of maintaining its properties at temperatures as high as 1000° F. The plugs are "hot-lapped" into the bodies at a temperature corresponding to the service for which they are intended, assuring the most accurate fit and extremely smooth operation. Further details upon request.

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C N G A

JUNE FROLIC 1940

l Magruder, L. V. Cassaday, Tom Taggart and Jess Burns.

Bill McGraw, J. C. Rector, H. L. McCarty and H. F. Keene.

Walter Kindred, K. C. Tomlinson, Elting Henderson and J. J. Delaney.

H. E. Leedy, M. J. Burress, I. B. Hughes and W. E. Landis.

Harvey, L. C. Rowson.

M. C. Bjoorn, Harold Linhoff, Frank Colton and W. S. Johnson.

Frank Burt, L. J. Blessing.

E. P. Donahue, M. W. Kibre and Harry Kraemer.

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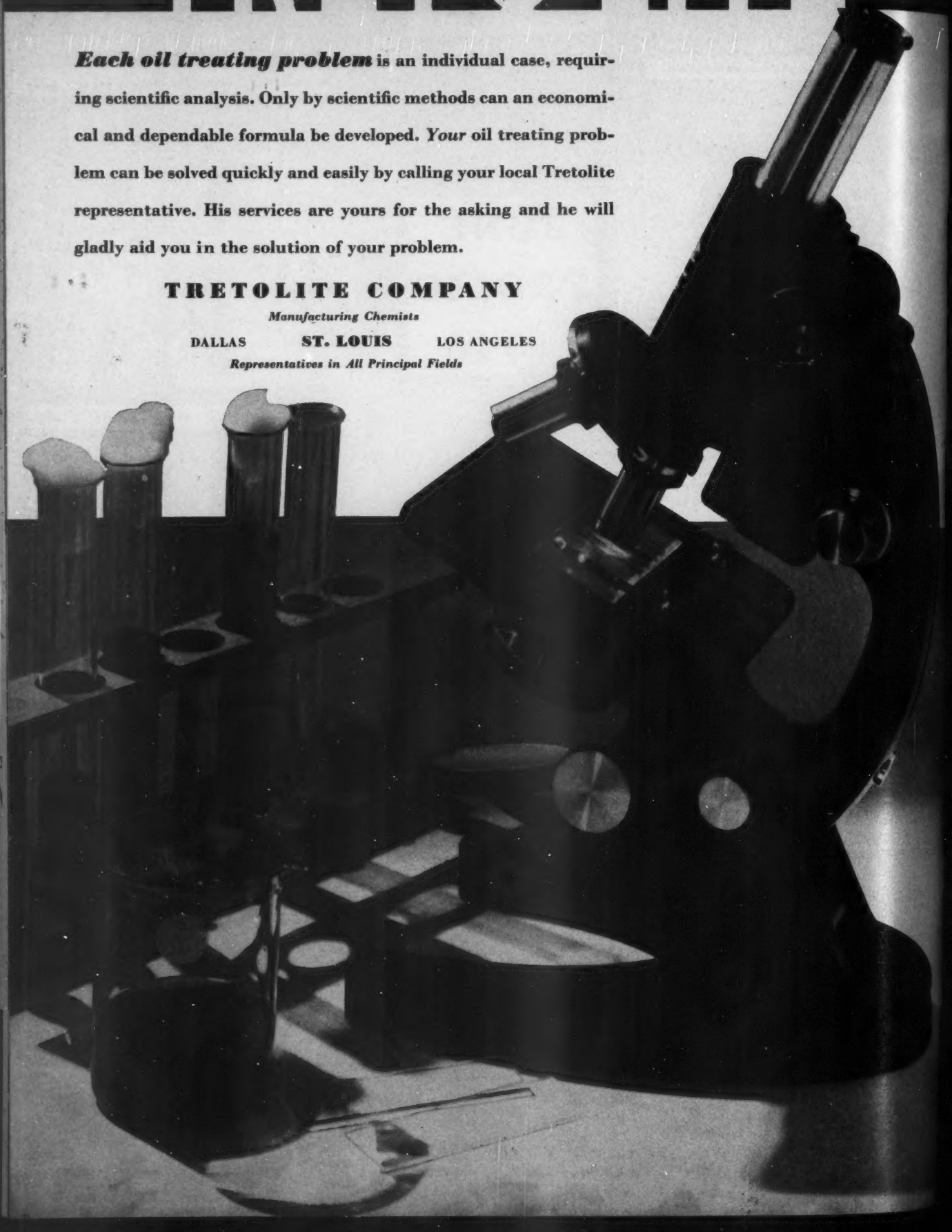


CNGA

George Trembly, Wallace Rushing, J. H. Hayter and R. E. Barton.

Frank Smith, Guy Morrill, Tom Burtt and Joe Aderhold.

ard, Walter Dayhuff, Carl Madsen and Coles Basoth.

Tom Taggart tees off with and explosion shot.

R. S. Tulin, R. J. Kettenburg and H. C. Wood.

1940

. Blake, Bob Sutherland, Bill Ellery and C. R. Dodson.

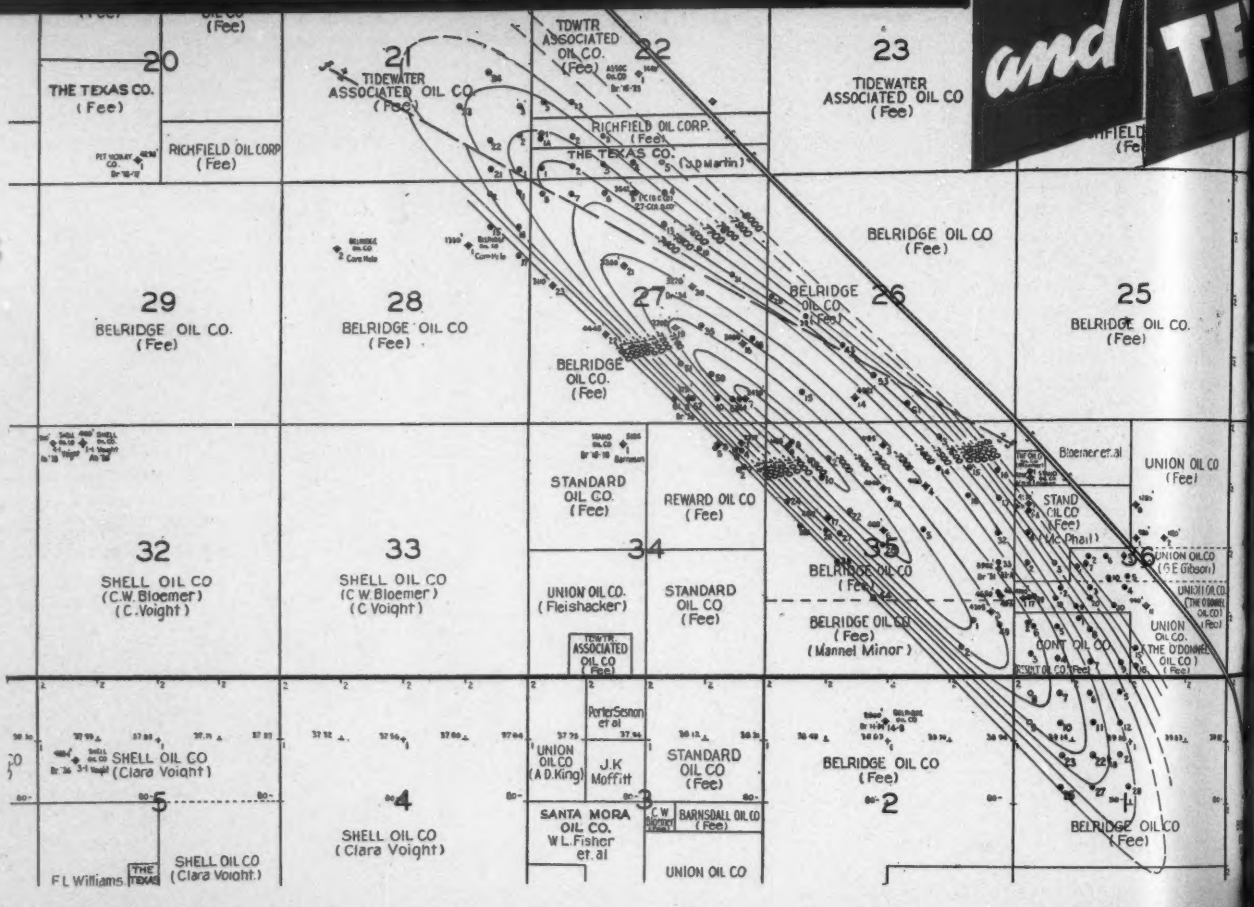
W. T. Lohmeyer, Perry Kilsby, Henry Wardeman and A. W. Westerbeck.

Facing you are Kinzie Miller, Fred Doyle and H. C. Teendel.

JUNE FROLIC

Jack Delaney, Phil Magruder and Harry F

1940 Edition CALIFORNIA OIL WORLD DIRECTORY



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In response to your enthusiastic reception of the large MAP SECTION included in the 1939 edition of the CALIFORNIA OIL WORLD DIRECTORY, we are including an even greater section in the 1940 edition, now in preparation.

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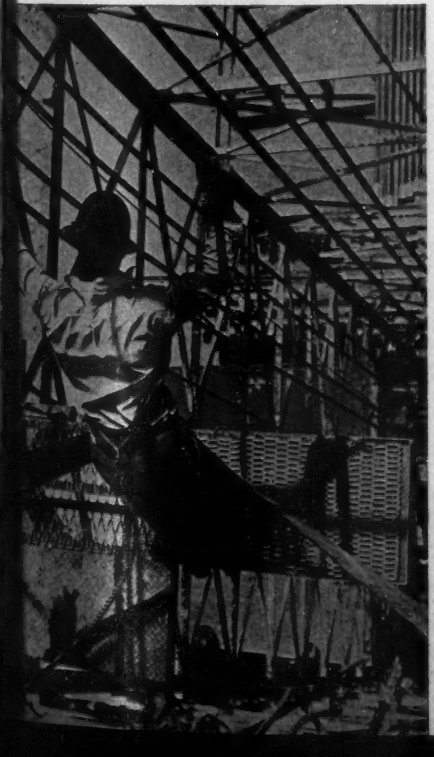

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Harry Fiske and Fred Doyle.

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1940

Another... LUMMUS CRACKING UNIT Accepted

This one after 18 days of initial run

For a major oil company Lummus recently completed a Lummus Combination Three-Coil Cracking Unit . . . viscosity-breaking, gas oil and heavy naphtha reforming. » » » Eighteen days after the unit was put on stream it was completely accepted, having met all guarantees. The initial run was continued to 25 days, when the unit was shut down for inspection purposes. » » » This recently completed unit — the ninth consecutive Lummus Cracking Unit to be accepted during initial firing runs of 25 days or more — is equipped with Lummus Floor-Fired, Raised Hearth Heaters, with improved steam generation feature in the convection section. Provision is also made for steam generation from waste heat.

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LUMMUS

PETROLEUM REFINING PLANTS

Tide Water Obtains New Avenue Producer

Tide Water Associated Oil Co. obtained the only new completion in the Ventura Avenue field during the past fortnight by swabbing in McGonigle No. 17. Bottomed in the upper portion of the Class IV zone at 10,050 ft., the initial yield was 1417 bbls. of 29.4 gravity oil and 1,252,000 cu. ft. of gas.

Still one of the busiest fields in California, at least half a dozen wells will soon be ready for completion at Ventura Avenue where Shell Oil Co., Tide Water Associated Oil Co., California Alliance Petroleum Co. and British American Oil Producing Co. all have wells at critical depths.

East of the field, Lloyd Corp. suspended operations in its core-hole at 1300 ft.

The Barnato Corp. Acquires Oil Group

Taking over the Oil Group, Inc. well at Summerland, The Barnato Corp. recovered the fish in the hole and is drilling ahead at 3100 ft. in hard Sespe shale. The project is located on a hill half a mile back of the residential district.

"Conversion of Petroleum"

To summarize the fundamental principles and practices of converting petroleum products into gasoline and other fuels is the object of "Conversion of Petroleum, Production of Motor Fuels by Thermal and Catalytic Processes", by A. N. Sachanen, just published by Reinhold Publishing Corporation. Because of the wide scope of his field, the author has been forced to condense the text and to omit historical data and consideration of patents.

The book contains comprehensive data on thermal and catalytic reactions, cracking, hydrogenation, refining equipment, treating methods, and products. The more important cracking methods are discussed and the equipment described and illustrated with charts. From a survey of the enormous literature on the subject, the author comments only on the work that is most important to his purpose. However, the extensive bibliography at the end of each chapter is a valuable feature of the book.

The book will be welcomed by the refinery technologist as well as by the average oil man who is confused by the rapid progress in the science of petroleum refining.

"Conversion of Petroleum, Production of Motor Fuels by Thermal and Catalytic Processes," by A. N. Sachanen. Clothbound, 398 pages, tables and charts Published by Reinhold Publishing Corporation, 330 West 42nd Street, New York. Price $6.

Jergins "Cat" Shows No Life

With the operator still refusing to give out confirmed information concerning the Jergins Oil Co.'s Mendota area wildcat, Cheney Ranch No. 1, reliable reports indicate that tests to date have not been encouraging.

Drilled to 9345 ft. in what is believed to be Cretaceous, the well was plugged to approximately 7000 ft. where sands believed to be gas horizons were encountered and tested during drilling. With perforated liner landed on the plug and cemented through perforations at an unknown point, tubing was run with a packer set at approximately 6650 ft. After 36 hours of swabbing without visible follow up, an with the well showing none of the "life" predicted by those close to operations, the tubing was pulled and the hole was cleaned out. With the disposition of the hole yet undetermined, the crew is at present fishing liner to permit further work.

Pressures up to 6000 pounds p.s.i. must be held safely by Nordstrom Valves in oil refineries and chemical plants. Temperatures three times as high as boiling water and away below zero must be encountered without failure.

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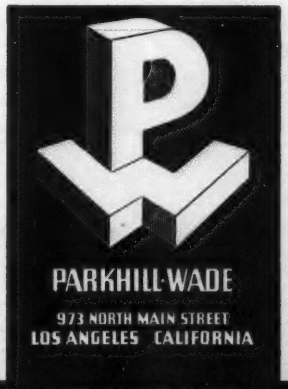

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Purchasing Personnel-ities

By Leo S. Busby,
Associate Editor, Southwest Purchasing Agent

We indeed had an unusual stroke of good fortune this month in obtaining the assistance of Paul Drus in writing up a story on the purchasing department of The Petrol Corporation. Many of you, no doubt, have enjoyed Paul's fantastic Ding Pedro stories as featured by Ted Cook in the Los Angeles Examiner. Paul, incidentally, is hailed by the famous Gertrude Stein as a budding literary genius. We take pleasure in presenting to you:

THREE GOOD EGGS IN THE NEST OF PETROL PETE

By Paul Drus

When you see Petrol Pete the Pelican stomping across the bulletin boards and in the newspapers to challenge the other leading brands of gasoline, you no doubt wonder, "What sort of Corporation is this, that suddenly leases a whole building and becomes such an aggressive factor in the gasoline market?"

Which leads us back of the scenes and right smack into G. B. Taylor of the purchasing department. In appearance, this bronzed faced man could be a Geology professor. And this might have been so, if as a young fellow, Taylor had not taken a last puff of the pipe he was smoking in the Ricks Academy up in Idaho. Discovered by a horrified member of the faculty, young Taylor was asked to leave immediately.

He packed his favorite fishpole along with his other belongings, paid his departing respects to the Snake River and its banks upon which he was born; and with ten dollars in his pockets in 1922 he started out to see what Los Angeles was like. But young Taylor's optimism was far greater than the contents of his pocketbook, for Wyoming was as far as the money held out. He unloaded casing from cars in Parco, of the Indian-paintbrush state. Due to an accident he was transferred to the office and started pushing a pencil.

So it was that the career of G. B. Taylor began in the petroleum business. Six years field office management of the division office of the Hope Engineering Company at Casper, Wyoming; purchasing and accounting on construction of natural gas pipelines, city distribution systems and pumping stations. Two years traveling as field manager, setting up construction offices. Then four years as comptroller and purchasing agent for Northwest Stellarene Company.

Mr. Taylor also worked as field office manager and purchasing agent for the Ralph M. Parsons Company of Chicago and this led him into California as purchasing agent on construction of the 2¾ million dollar refinery for the Wilshire Oil Company at Santa Fe Springs, California. This led to his being transferred into the Chicago office as manager of purchases for The Parsons Company.

G. B. Taylor

Then G. B. Taylor came to The Petrol Corporation, an up and coming concern; progressive, with young ideas and personnel.

Buying is handled by the Los Angeles office for the following field operations: Huntington Beach, Playa Del Rey, Redondo Beach, Bakersfield, Gato Ridge, Stockton, Wilmington and Los Angeles refinery operations. The purchasing is very diversified. It includes refining and drilling material. Water terminal maintenance is attended to. Submarine hose is purchased. The latest addition to his duties is service station maintenance, painting black-topping, pump repairing and renewals.

Taylor buys six transport tankers or heavy refining equipment costing $50,000.00. Then turns around and buys 400 sacks of sawdust for drilling operations, or Christmas tree decorations for a company party.

He was called the bronze faced Mr. Taylor at the beginning of this story and attention was directed as to how he packed away his fishpole with his personal belongings when the indignant faculty of Ricks Academy told him never to darken its hallowed halls again.

Yes, G. B. Taylor is a fisherman and an uncommon one at that; so listen to the saga of Taylor the sportsman and modern voyageur.

There is a Japanese millionaire who made his fortune manufacturing pearl buttons from oyster shells. He now spends all of his time in repentance, building Shinto shrines and saying prayers for the departed souls of the oysters that forfeited their lives to become pearl buttons.

Now G. B. Taylor is no millionaire, but if he ever started praying for the souls of all the fish he caught, The Petrol Corporation would lose a purchasing agent and the Los Angeles Plaza would gain another **Apostle.**

There is the mounted head of the fine twenty-nine pound mackinaw trout on the wall of his home whose soul would need a mighty long prayer. It was taken from the waters of Glacier National Park in Montana. The largest fish ever taken from those waters. Then there are the departed souls of fish in fifteen states of the Union that would selfishly demand their share of his praying, for Taylor has caught trout in Wyoming, Montana, Idaho and Colorado. He has caught Muskies in Northern Michigan's Huggin Lake. He has angled for the so called trout (Bream) in Alabama and extracted his toll from the assorted salt water fish in the Pacific Ocean. The famous Greyling of the Montana white water have struck at his hooks.

Taylor is a sort of mechanized Hiawatha. He packs his fishing tackle, salt sowbelly and flapjack flour into a canoe, kicks over the outboard motor and is off. This is the way he made two trips after bass into the virgin headwaters above Boulder dam. He is now planning a return trip to that country.

There are two worthy assistants in the purchasing personnel—Miss Lorretta Lemire, a true Montana product. She received her training in the petroleum business and cut her eye-teeth on the oil drills of the bitter-root state. She was two years in the purchasing department of the Wilshire Oil Company. The records show that she was never caught in making an error in the handling of invoices or in the routing of purchase orders. She handles the secretarial work along with the invoices. Miss Lemire also does the purchasing of all office supplies. She is a very able assistant. She has now been with Petrol for over two years.

Miss Mary Williamson is the latest addition to the Petrol Purchasing department. A comptometer operator, the handling of invoices, carrying extensions, etc. are second nature to her. She has been with the corporation for the past year.

Such a personnel is small, but compact and capable enough to handle any purchasing job of the corporation.

If you want to get along with Taylor, just nonchalantly mention that you purchased a new fish pole and wonder where you could put it into service.

LAUGH THIS OFF

It is grand in these troublous times to know you're living in a free country where you can say exactly what you think so long as it doesn't upset your wife, your neighbors, your boss, your business, or your reputation.

And from **George Simpkins** we have just received the distressing report that an oil man who hadn't kissed his wife for five years just shot another oil man who did.

Howard Whittaker also tells a weird story about a rousty who used such awful language that the other day when he was made to swallow his words, he almost died of indigestion.

Which recalls the case of the pumper and the preacher who arrived at the Union Depot just as the tail end of their train disappeared. The pumper threw down his baggage, tore his hair, and let loose such a stream of vituperation as has never been heard since Hector was a pup. When he was all finished, the preacher beamed at him and remarked fervently, "Thanks, my good man, a thousand thanks."

You know, of course, that when a pumper takes a holiday, he doesn't do anything then either.

At which stage we are interrupted by **Bill Boatman** who asks if we had noticed that Dewey wears his teeth parted in the middle.

And **Bee Burgess** claims he took an oil man to church with him last Sunday much to their joint embarrassment. It seems that they have the pledge system in Bee's church, and when collection time came, the plate was passed along and the folks all deposited their little pledge envelopes, that is, all but the guest, who whispered hoarsely as he took it, "I can't vote. I ain't naturalized!"

Whereupon the chair recognizes **Roy Benson** who comes contending that with summer hard upon us many oilmen's wives with no knowledge of the show business are nevertheless doing a very expert trip tease act.

However, as **Rod Durkee** always said, "It's a long Lane that has no Wells."

And we know one lad who during his days off last week went down to Westlake Park to see how the ducks manage to liquidate their bills.

"I wouldn't say he's a thief," said the rousty about a lad who was under suspicion for some night skirmishing in the boarding house, "but if I was a chicken and he was around, I'd certainly roost high."

Also, when we asked **Frick Gibbs** how many fish he had caught on his trip with **Earle Gard**, he turned to Earle and said, "How many was it we agreed on again?"

Frick, incidentally, suggests that you can keep the bathtub from running over by not paying the water bill.

Ted Sutter now declares that one of the thinnest men he ever knew fell off a 1000 barrel tank the other day, but he fell down plump.

And **John Tete** tells about a lad who got the grippe from a Free Mason.

One thing really commendable about a dictaphone, according to **Bob Paul**, is that it doesn't take your mind off your work by crossing its knees.

On the other hand, of course, they are anything but comfortable on your lap.

By the way, we have just read in a local newspaper that a Long Beach woman is suing an oil man for non-support. If it's non-support she wants, she couldn't go to a better guy than an oil man to get it.

All of which ends another unusually useless session. Remember, flattery is just so much soft soap—and soft soap is 90 per cent lye.

And about all nickels are good for any more is to make change for quarters.

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Field Development

San Joaquin Valley

2nd Well Finished In Paloma Oil Field

After a long history of hard luck, Ohio Oil Co. finished KCL No. B-2-43-3 in the discovery section, 3,32-26, of the Paloma field. Bottomed at 10,361 ft. and redrilled to 10,145 ft., the well was finished flowing 1900 bbls. of 51 gravity oil through a ½ in bean. Gas was measured at 12,340,000 cu. ft. daily.

This is the first well to be completed in the area since Western Gulf Oil Co., operating jointly with The Texas Co., completed it's discovery well KCL No. A-54-3 in August 1939. Western Gulf's second effort, No. A-74-3, is at present testing up-hole after exploring the lower Stevens Zone to 11,216 ft. The company has built rig for KCL No. A-34-2 in the adjoining section to determine in part the easterly extent of productive sands.

Wasco Field Work Stopped by Fish

Hole-making work is temporarily halted in both Wasco wells by fishing jobs. Pacific Western Oil Co.'s Meyer No. 1 is cutting and pulling a drill pipe fish from 8035 ft. after making hole to 10,323 ft. and Standard Oil Co.'s Mushrush No. 5 is fishing bit cutters after bottoming in brown shale at 10,965 ft.

Cantua Creek Well Stands Shut In

With last production gauged at 340,000 cu. ft. of gas, 53 bbls. of salt water and 7 bbls. of condensate on an open flow test, The Texas Co.'s S. P. No. 1, is shut-in with 2875 lbs. pressure on the tubing and 2925 lbs. on the casing. Located in sec 23-17-15 in the Cantua Creek district of Fresno county, the well is the first to achieve production. Many wells have been drilled exceeding this one's 10,116 ft., but none found evidence of commercial production. It is rumored the company is planning another well on a location thought to be higher on structure.

Northwest of this well, in sec. 26,16-14, J. E. Logan is drilling Yearout No. 44 near the 7800-ft. level and should soon top the Eocene. Kreyenhagen horizons were found at 6830 ft. Most northerly well ever drilled to deep sands in this area, it should clarify the picture on Eocene sands in which it hopes to find a stratigraphically trapped oil accumulation.

Jacalitos Test Near 4000 Feet

Seeking Eocene sands, found present and saturated in the Coalinga and Kettleman fields, Continental Oil Co. is drilling Kreyenhagen No. 1 below 3600 ft.

Located in sec. 4,22-16, just off the surface trace of the Jacalitos anticline, it is hoped the well will find a fully closed structure similar to one or the other of its neighbors.

Interest Centers on Midway Deep Projects

With Honolulu Oil Corp. drilling No. 25-P, a deep try in sec. 10,32-24 high up in the Buena Vista Hills, and Mascot Oil Co. rigging up to drill No. 56 to deep sands believed to be productive under sec.

SAN JOAQUIN VALLEY WILDCATS

Area	Well	No.	Section	Depth	Status
	Fresno County				
Cantua Creek	Logan, J. E., Jr., Yearout	44	26, 16-14	7600	Drilling
	The Texas Co., S.P.	1	23, 17-15	10116	Shut in
Coalinga	Lewis, C. H.	1	18, 21-15	2298	Idle
	Shell Oil Co.	45–2	2, 20-15	3745	Cleaning out
Jacalitos Hills	Continental Oil Co., Kreyenhagen	1	4, 22-16	3696	Drilling
Kingsburg	Erickson & Swanson	2	22, 16-22	1421	Drilling
Mendota	Jergins Oil Co., Cheney Ranch	1	29, 14-13	9345	Pulling liner
	Kern County				
Belridge—South	Delanty & Sutton, Burnoel	1	28, 28-22		Rigging up
	Santa Mora Oil Co.	1	10, 28-20		Material
	Union Oil Co., Fitzgerald-Weston	1	13, 29-21	7493	Abandoned
Devil's Den	Trigg, H. C.	1	11, 25-18	510	Idle
Edison	Goodrum & Vincent, Inc., S.P.	5	31, 29-30	533	Idle
Grapevine	Kern Line Oil Co.	1	19, 11-19		Rigging up
	Richfield Oil Corp., Tejon Ranch	1	2, 10-19	6688	Fishing D. P.
Greeley—South	Superior Oil Co., Brandt	1	28, 29-26	10855	Drilling
McKittrick	Hoyt, Otis, Union	1	6, 30-22	2526	Bailing
Midway	Republic Pet. Corp., C.H.	1	18, 32-23	2465	Flowing 150b/d
Richgrove	Bolling Oil Co., Quinn	1	14, 25-27	2460	Abandoned
Semitropic	North Kern Oil Co., Sawyer	1	16, 25-22	6620	Idle
Shale Hills	Gen. Pet. Corp., Twisselman	1	31, 27-19	966	Drilling
	Scotia Exploration Co., Abbott	1	7, 27-19	2047	Idle
	The Texas Co., McD-Theta	1	12, 28-19	4110	Drilling
Wheeler Ridge	Richfield Oil Corp. KCL	2	28, 11-20	4263	Drilling
	Kings County				
Kettleman—South Dome	Bristol Oil Co., Smith	1	35, 24-19	8054	Idle
	Tulare County				
Trico	Tidewater Assoc. Oil Co., Daniels	35	22, 24-23	8963	Drilling

26,32-23, the Midway area, long productive at shallow depths, is a point of Valley interest.

Honolulu's No. 25-P was last reported drilling in brown shale at 4285 ft. after marking streaks of sand showing oil near the 300 ft. level.

The Mascot project, in the northeast quarter of the section, is located a quarter of a mile east of a 9753 ft. well drilled by the Standard Oil Co.

At the westerly flank of Midway shallow production, Republic Petroleum Co.'s C. H. No. 1 demonstrated that the shallow potentialities are far from exhausted.

Located in sec. 18,32-23, due west of the City of Taft, the well is reported flowing 16.5 gravity oil through the pump at a 150 barrel rate. Drilled originally as a corehole, the well first excited general interest by finding good looking tar sands below 750 ft. With a regulation derrick built over the 1576 ft. exploratory hole, the well was carried to 2457 ft. after finding the producing horizon near 1838 ft. Bottom was plugged to 1887 ft., a 7 in. water string cemented at 1770 ft. and 5½ in. liner including 90 ft. of perforations run to bottom. Expecting the normal shallow production found in the shallow west side wells, a pumping unit was installed but after a short time on the beam the well pumped itself in and at last report was flowing through the pump.

Operators of the well are of the opinion that while the new area is good it will probably not exceed a hundred acres in extent.

El Rey Well Pumps 60 B/D

Apparently only a 60 bbl. well is El Rey Oil Co.'s wildcat well located at the northwest corner of Western Ave. and Imperial Highway. Bottomed at 9063 ft. and plugged to 9000 ft., the well produces a 370-ft. interval in the Miocene thought to be the equivalent of the O'Dea zone of the Rosecrans field. Because of its excessive depth the project is hardly a commercial producer and several chemical treatments have been tried to increase the yield. Gravity of the oil is 32 and the cut is less than 2.0% according to J. E. Pettijohn who operates the well.

Grapevine Test Fishing Drill Pipe

Richfield Oil Corp.'s Tejon Ranch No. 1 in sec. 2,10-19, bottomed in basalt at 6688 ft., is fishing drill pipe at 5050 ft. The drill had just entered the second body of hard digging volcanics when the formation fouled the string. The first body of the basalt carried from 5625 to 6510 ft. and was negotiated without difficulty.

Beyond the north end of the Grapevine field area, near the center of sec. 19,11-19, Kern Line Oil Co. is rigging up to drill well No. 1 on a small structure which was indicated as closed by an electric interpreting device.

McKittrick Well Bailing Sand

Otis Hoyt's recent completion, Union No. 1, is bailing sand after completing for 225 barrels from 2526 ft. Located in sec. 6,30-22 the well's initial cut was estimated at 20% sand.

Kingsburg Well Repairs Equipment

Erickson & Swanson's No. 2 well, drilled in sec. 22,16-22 in the Kingsburg area approximately 14 miles north of Hanford, is repairing equipment after bottoming in hard sand at 1415 ft.

Belridge Well Flows Condensate

Belridge Oil Co.'s deep zone well No. 10-1, in sec. 1,28-20, was finished from 8251 ft. flowing 20,000,000 cu. ft. of gas with 185 bbls. of 51.2 gravity condensate through two 96/64 in. beans. The well is at present shut-in with 1860 lbs. on the tubing and 1950 lbs. on the casing.

The company's No. 3-35, redrilling at 7970 ft. encountered the "2nd deep zone at

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ART WHATLEY

7948 ft. No. 7-1 is standing with 9 in. cemented 7770 ft. and is bottomed in shale after finding the top of the first sand at 7768 ft.

Continental Oil Co.'s Result No. 4, sec. 36,27-20, is coring gray sand with slight oil showings at 8120 ft.

Trico Oil Test Near 9000 Feet

The current deep oil try in the Trico area, Tide Water Associated Oil Co.'s Daniels No. 35, is coring gray sandy shale at 9000 ft. Located north of the main gas producing area, in sec. 22,24-23, the well seeks production in the Vedder section of the Miocene which should soon be encountered.

In the gas field, Trico Oil & Gas Co.'s Newland No. 3, bottomed at 2462 ft., is shut-in after registering a 44,650,000 cu. ft. rate on a 20 minute test. The flow was through both tubing and casing and came from 40 ft. of shale streaked with gas sand topped at 2422 ft.

Fish Delays Castaic Test

Delayed for a week by a fishing job at 1800 ft., R. E. Havenstrite's Lincoln No. 1 is just getting underway again.. Located in sec. 16,4-17, the well is testing the Del Valle Anticline north of the Santa Clara river.

Richgrove "Cat" Strikes Granite

Bolling Oil Co.'s Quinn No. 1, drilled in sec. 14,25-27 in an effort to find production in the Richgrove district of Kern county, is abandoned at 2460 ft. after topping granite at 2435 ft. Barren Vedder sands were encountered at 2155 ft.

Bandini, Pure Complete Wells at Coalinga N. E.

Two wells at the southerly end of Coalinga Northeast field are completed after making big flows on preliminary tests.

Bandini Petroleum Co.'s No. 71-30B, bottomed in good oil sand at 8256 ft., flowed 25.7 gravity clean oil at a 4000-bbl. rate on test of the interval 8182-8243 ft. and is now on curtailed production.

Farther south, Pure Oil Co.'s Schwimm Estate No. 44-30B is also bottomed in good oil sand and completed. A test of the interval 9128-8188 ft. yielded an estimated flow of 2500 bbls. clean 26.4 gravity oil.

With the "EGA" point found to be at 8144 ft. and the gas-oil interface near 8175 ft., the Pure well indicates a swing of sand contours toward the Coalinga Eocene Pool to the south with possibly a narrow strip of production between. Water levels previously found in the field will prohibit the connection along the westerly limits of the sand with anything but a comparatively narrow neck.

Standard Oil Co. finished No. 82-19B flowing 3524 bbls. of clean 26.5 gravity oil with 2,259,000 cu. ft. of gas from 8245 ft.

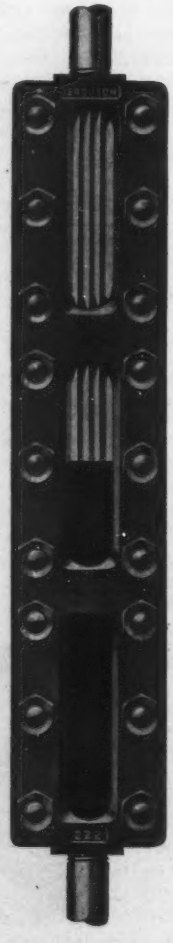
To the south in the Eocene Pool, Standard finished 88-12C flowing 4000 bbls. of 30.2 gravity oil and 2,889,000 cu. ft. of gas through a 42/64 in. bean. This well is bottomed at 7820 ft.

Topical Committee on Production Practice, A. P. I., held its June meeting at the Los Angeles Athletic Club on June 11. F. H. Taylor, Shell Oil Co., Inc., spoke on "Paraffin Problems in the Ventura Avenue Field", and the activities at the Mid-Year Meeting of the A. P. I. at Fort Worth, Texas were summarized. R. W. French, Continental Oil Co., is chairman of the Production Practice Committee.

More than 100 technical papers and reports are scheduled for presentation at the 1940 annual meeting of the American Society for Testing Materials to be held June 24 to 28 in Atlantic City.

JERGUSON

REFLEX GAGES



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Los Angeles Basin

Montebello Operators Deepen To Eighth Zone

Because of recent successes of Standard Oil Co. and Kern Oil Co., many Montebello operators are deepening their wells to the "Eight-Three" zone. Best of the newer re-completions was Kern Oil's Monterey No. 25 which deepened from 7660 ft. to 7785 ft. to obtain 1471 bbls. of oil and 3,382,000 cu. ft. of gas. Standard's last effort, Braun No. 8, which was flowing 90 bbls. a day through a 15/64 bean from 7660 ft., was taken to 7790 ft. swabbed in for 925 bbls. through a 1 in. bean. Gas increased from 800,000 cu. ft. to 2,375,000 cu. ft.

Montebello Wesco, Inc. deepened No. 1 to 7787 ft. and obtained 500 bbls. of oil and 4,000,000 cu. ft. of gas and Kern Oil finished Taylor No. 3 for better than 600 bbls.

Several wells are now deepening or are in the process of recompleting, among which are Wood-Callahan's Todd No. 2, Trader's Oil Co. No. 1, R. R. Bush Oil Co. Zanetti No. 2 and Stanley Oil Co. No. 1 which will be deepened by D. W. Elliott.

C.A.P. Oil Co.'s Dutch No. 1, recently taken over by Sam Brooks, was used by Warner Bros. for the filming of a thriller called "Flowing Gold".

Mission To Prove Rosecrans Section

Dependent on forthcoming tests in Mission Oil Co.'s Pierce No. 1 is the future of the southeast section of the Rosecrans field. Drilled to 8546 ft. and with liner landed on bottom and cemented through perforations at 8405 ft., the well is believed to be open in the same sands from which Barnsdall Oil Co.'s Darling Community No. 1 has produced over 125,000 bbls. since its completion last fall. Correlations in this section are, however, extremely difficult and the zone in the Darling well very thin so when swabbing starts, anything may happen.

Across Compton Blvd. to the north of the Mission well, Chicago Oil Co. is preparing to test from 7100 ft. to 7325 ft. after swabbing with the hole open to bottom at 7971 ft. and recovering salt water. Meanwhile, Midfield Oil Co. has not rigged up and Rainbow Petroleum Co. has suspended drilling pending production tests by Mission and Chicago. Lone active driller in the southeast area is Crest Petroleum Co.'s Wolf No. 1 which is located south of Redondo Blvd. and west of San Pedro St.

In the Main St. section, Southern California Petroleum Corp. is completing Rowena No. 2 and preparing to drill Van Nuys No. 1 while St. Anthony Oil Corp.'s Gordon No. 2 is standing cemented and Thos. Kelly & Son's McMillen No. 3 is preparing to run a water string.

8831-Bbl. Potential Set In Wilmington Completion

Again demonstrating that Wilmington is one of the immortals along with Signal Hill, Santa Fe Springs and Kettleman Hills, the nearly four year old wonder field last week was the scene of an 8831 bbl. completion. The big producer was brought in by Union Pacific Railroad Co. and was drilled on property of the Edison Co. at the easterly end of Terminal Island.

No. E-25, as the well is called, was finished at 4037 ft. with perforations open in both upper and lower Terminal zones below 3058 ft. Tubing was set on a lead-seal packer at 3529 ft. in a 100 ft. blank section between the zones.

Two fair wells were completed in the extreme northwest end of the Wilmington townlot area, Barnhart-Morrow Consolidated's Wilmington No. 2 initialling 290 bbls. a day and Coastline Oil Co.'s No. 1 making 255 bbls. The former well produces the Ranger and Terminal zones from 3030 ft. to 3720 ft. while the latter is open below 2730 ft. including the Tar zone.

In the northeasterly Long Beach area, Ed Power's No. 17 came in for an estimated 150 bbls. from 3485 ft. On Long Beach municipal tidelands Long Beach Oil Development Co. finished "W" Nos. 13 and 14 in the Ranger and Terminal zones. Both are situated in the Brighton Beach area of Terminal Island.

Standard Completes Huntington Beach Well

Completing Bolsa No. 41 as its first new Huntington Beach well in a long time, Standard Oil Co. obtained a 140-bbl. yield of oil plus about 120 bbls. of water. Located at the foot of the bluff at the west edge of the old field, the hole was carried to 3800 ft. but was plugged to 2950 ft. above which point a 350 ft. interval is open. On an adjoining location, Bolsa No. 42 is running a formation tester every 50 ft. below 2550 ft. in order that the best horizons may be picked when it is completed.

Surf Associates, Inc. and The Termo Co. are each drilling a directionally controlled well to bottom beneath State owned tidelands. Southwest Explora-

LOS ANGELES BASIN WILDCATS

Area	Well	No.	Section	Depth	Status
Athens	Melrose Pet. Co.	1	12, 3-14		Rig
Castaic	Colter, R. T., Explor.	1	8, 4-17	1338	Idle
	Havenstrite, R. E., Lincoln	1	16, 4-17	1806	Reaming
Dominguez, West	Wood-Mellon Oil Co., Wood	1	31, 3-13	6425	Side tracking fish
Inglewood	Vanguard Oil Co., L.A.I.	1	29, 2-14	1041	Idle
La Habra	Security Land & Water Co.	1	9, 3-10	1171	Drilling
	Union Oil Co., Sansinena	12	31, 3-10	5157	Redrilling 2100
Mint Canyon	Redwood Oil Co., Mitchell	2	22, 4-15	880	Drilling
Newhall	British-American Oil Prod. Co., Edwina	1	14, 3-16	6196	Testing
	Canyon Oil Co., Sanborn	1	6, 3-16		Rig
	Consoliated, Pet. Co., Needham	4	13, 3-16	4398	Idle
	Creighton Hammon Synd., C.H.	1	17, 3-16	775	Drilling
Palos Verdes	Rolling Hills Pet.	1	27, 4-14	6580	Fish packer
San Fernando	Parry, Geo. G., Moynier-Parry	1	6, 2-14	3620	Drilling
Sunland	Casa Grande Oil Co., Lopez-Lundy	1	1, 2-15	3785	Idle
West Whittier	Cal. Pico Oil Co., Beach	1	7, 2-11		Rigging up
	Orange County				
Anaheim	Morton, Lindley C., Thomas	1	23, 4-10	2376	Drilling
Buena Park	Tucker, H. M., Heath	1	34, 3-11	8780	Drilling
Costa Mesa	Thompson, Milton N., Banning	1	9, 6-10	5625	Idle
Garden Grove	Bird & Chambers	1	31, 4-10	1250	Idle

NORTHERN COUNTIES WILDCATS

County	Well	No.	Section	Depth	Status
Merced	Don Pedro Oil Co.	1	9, 6s-9e		Location
Monterey	Loma Grande Oil Co., Corey	1	23, 24s-10e	600	Drilling
	Priest Valley Pet. Co., Greve	1	22, 20s-12e	2730	Repairing rig
Sacramento	Bishop Oil Co., Willmar	1	21, 4n-3e		Location
San Mateo	Ra-Lite Petroleum, Inc., Bell	5	16, 7s-4w		Rigging up
	Wilshire Oil Co., Cowell	3	17, 6s-5w	140	Drilling

tion Co. is temporarily inactive having given its entire drilling personnel a vacation after completing No. 29 on the pump at an estimated 300 bbl. rate.

In the Alabama St. section of the old field, The Petroleum Co. is redrilling Wilson No. 6 at 2900 ft. Casing has been cemented at 2720 ft.

Pacific American Oil Co. is preparing to drill a new hole, No. 7, in the Ashton area.

Bartholomae Completes Big Coyote Pumper

Continuing with its development of the Stern property in the westerly section of East Coyote, Bartholomae Oil Corp. completed No. 9 pumping and flowing nearly 600 bbls. from the newly opened deep zone. Although details have been withheld by the company, it is believed that the hole was bottomed at about 6500 ft. and that approximately 650 ft. is open to production giving the well a much greater zone penetration than No. 1 which was deepened a few months ago discovering the horizon.

In the little "Hot Spot" area along Golden Ave. Fred Garliepp and Hathaway Co. are making production tests which may determine the future of the field. The Garliepp well, redrilled to 3350 ft. and with casing cemented at 3085 ft., has just been put on the beam with no estimates of production yet available while Hathaway's Anderson No. 5 is pumping a small amount of fluid after cementing casing on bottom at 4280 ft. and perforating at 4250 ft. Master Petroleum Co., whose deepening of Lemke No. 1 and consequent recompletion for 400 bbls. started the play, is working on two wells while all other operators stand by for results.

In the Yorba Linda end of the field, Silver Star Oil Co. is drilling a third well on the Fricke lease.

Tucker Well Tops Repetto

Harrison M. Tucker's Heath No. 1, located in sec. 34,3-11 west of Buena Park, is reported drilling at 8780 ft. after topping Repetto at the rather low level of 8715 ft.

Gibraltar Tests Dominguez Edge

Gibraltar Drilling Co.'s well at the southwest corner of Victoria Ave. and Avalon Blvd. seems now to definitely mark the edge of Dominguez production in that direction. With bottom at 8209 ft. and casing set at the top of the Eighth Calender zone at 7972 ft., production tests so-far indicate a structural position too low for commercial yield.

Shell Oil Co. drilled Reyes No. 105 as a "slim holer", setting 9⅝ in. surface casing and 5¾ in. water string at 4160 ft. A perforated 4½-in. liner was landed on plugged bottom, 4290 ft., and the well swabbed in on gas lift at a 15-bbl. per hour rate.

Union Oil Co. has three wells drilling and has derricks up for two more.

Anaheim Wildcat Drills Below 2000 Ft.

A depth of 2048 ft. is reported on Lindley C. Morton's latest wildcat venture, Thomas No. 1. The project is the latest of a series drilled in recent years centering around the city of Anaheim in Orange county.

Union Re-Drills Sansinena No. 12

After finding all formations barren to 5157 ft., Union Oil Co. plugged Sansinena No. 12 above 2000 ft. to redrill in hope of finding production by means of controlled drilling. The well is a wildcat two miles southeast of the old Whittier field and

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about half a mile west of Hudson Road between La Habra and Puente.

Southeast of La Habra in sec. 9,3-10, Security Land & Water Co. is drilling Security No. 1 near the 1300 ft. level.

British American Tests Edwina No. 1 at Newhall

With a fish in the bottom of the hole, British American Oil Producing Co. is making a test of higher showings in Edwina No. 1, its mystery well in sec. 11,3-16 near Newhall.

While drilling at 6196 ft., the drill pipe twisted off at 5861 ft. and after several runs failed to pick up the fish, the hole was plugged to an unknown point for the running of steel liner. Between 5430 and 5510 ft. a solid body of light oil sand was cored, tests of which indicated fair to good permeability, porosity and saturation.

San Fernando Well Strikes Basement

Geo. Parry's attempt to find production in the San Fernando district seems doomed to failure with usually reliable sources reporting granite at 3525 ft. Known as Moynier-Parry No. 1, the well is located in sec. 6,2-14.

Deepened to 3785 ft., Casa Grande Oil Co.'s No. 1 in sec. 1,2-15 recovered water with only a trace of gas on a formation test.

Bush Oil Co. Seeks Inglewood Miocene

Seeking production in Miocene sands similar to the O'Dea zone at Rosecrans, R. R. Bush Oil Co. is drilling below 5800 ft. on the Sentous property on the west bank of the old Inglewood field. The well tests the theory that the axis of the fold shifts to the west with depth.

At the north end of the field, Federal Oil Co.'s Smith No. 1 is idle at 6700 ft. The Miocene was not found in this well because of a fault of large displacement.

Signal Hill Activity Is Widely Scattered

Activity at Signal Hill is widely scattered throughout the whole field, there being at present no individual hot spot. S. C. Bush is drilling Exchange No. 3 at 2700 ft. on the crest of the hill, while just west of Cherry Ave. on 25th St., Dormax Oil Co. is below 5000 ft. in No. 2. R. W. Jerman's Knight No. 4 at 29th St. and California Ave. is drilling at 2100 ft.

In the Pepper Drive area, M.B.C. Oil Co. is recompleting the old Woolner Fee No. 2 in the Upper Wilbur zone. It is the last of the wells started during the recent boom.

A block southeast of the field's discovery well, Alamitos No. 1, Oceanic Oil Co. is redrilling its No. 4 at 4350 ft. The Texas Co. cemented surface casing in Bauman No. 6 at 700 ft.

Athens Deep Test Coring Fair Sand

The Athens deep test of Thorley Oil Co. is attracting much interest now as it cores streaks of fair oil sand at 7800 ft. With the top of the Miocene placed at 7350 ft., it is believed the present sand zone, topped at 7780 ft., is probably similar to the O'Dea zone at the south end of the field. If farther penetration discloses an adequate sand body the discovery will assume important proportions.

Only other deep well in this portion of the field is the old Miley Oil Co. Athens No. 6 which was drilled to 7500 ft., a world's record, fifteen years ago.

Holly Park Well Flows 50 Gr. Oil

Flowing 50 gravity oil at a 30 bbl. rate and 400,000 cu. ft. of gas, through a quarter inch bean, Turf Oil Co. brought in its first well on the Hollywood Park race track property at Potrero. Bottomed at 8446 ft. and plugged to 8390 ft., the well is the second in the field to produce from the Miocene formation. A 200 ft. interval is being produced.

On the golf course to the north, Basin Oil Co. is preparing to drill C-9 which will be followed by two more wells.

Pasadena Operators Plan Belridge Well

Sole active operators in the South Belridge area, Delanty & Sutton of Pasadena are rigging up to drill Burnoel No. 1 in the northeast corner of sec. 28,28-22. The test, lying half way between South Belridge Buttonwillow is to be carried to the 3000 ft. level.

Second Pyramid Well Misses Shallow Sand

Tide Water Associated Oil Co.'s attempt to determine the productive area of the shallow sands found in West Slope No. 1 misfired in the deepening of an old corehole, Pyramid Fee No. 1, in sec. 18, 24-18.

West Slope No. 1, drilled in sec. 20, 24-18, was finished pumping 40 bbls. daily from 950 ft. but the old Pyramid Fee core hole, deepened to Cretaceous at 1038 ft., found no oil sand.

General Pet. Spuds Shale Hills Wildcat

On the Twisselman Ranch in the Shale Hills area, General Petroleum Corp. is drilling Twisselman No. 1 below 1000 ft. While the ends and the east flank of the Shale Hills have been explored in the past, General Petroleum's well in sec. 31,27-19 tests a portion of the area never before drilled.

Five miles southeast in sec. 12,28-19, The Texas Co., long a participant in Shale Hills exploration, is drilling McDonald-Theta below 4115 ft.

In sec. 7,27-19, Scotia Exploration Co.'s

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Abbott No. 1 is still idle after making 2047 ft. of hole.

Lytle Prepares For Kettleman Eocene Try

Robert S. Lytle is building rig to drill Felix No. 5 to the Eocene sands in the Kettleman North Dome Field. Located in the southeast quarter of sec. 35,21-17, the Felix lease is one of the few pieces of proved acreage in the field which is not controlled by the Kettleman North Dome Association or the Standard Oil Co.

Another of the independently operated leases is Union Oil Co.'s Amerada-King upon which Union is drilling No. 9 at 10,488 ft. on the way to the deep sands.

The KND Assoc. is running six strings in the area while Standard is running four.

Universal Near Arvin Completion

On the Cattani lease, acquired by Universal Consolidated Oil Co. from the Superior Oil Co., No. 3 drilled into Chanac oil sand at 5996 ft., bottomed at 6168 ft. and cemented 8⅝ in. water string at 6135 ft.

This well is the lone operator in an area which came to peak production and development during 1939.

New Test Planned For Merced County

Don Pedro Oil Co. has made location for well No. 1 in the northeast quarter of sec. 9,6s-9e, in the Newman area of Merced county.

The Rio Vista area in Sacramento county is to have another gas well try when Bishop Oil Co. spuds Willmar No. 1 in sec. 21,4n-3e.

Late Coast

Wilshire Oil Re-enters Half Moon Bay District

Wilshire Oil Co. has re-entered the Half Moon Bay field and is drilling Cowell No. 3 in sec. 17,6s-5w. Located south of the first two wells, No. 3 will attempt completion in the 1500 ft. horizon from which its predecessors produce about 10 bbls. per day of 54 gravity oil.

Small, shallow production has been obtained from this area for many years but attempts to find more prolific deep sands have met with failure. Wilshire's first try in 1938 was carried to 8007 ft. and in the section to the north, Shell Oil Co.'s Cowell No. 1, drilled ten years before, went to 5009 ft. Numerous 2500 ft. wells have also failed to find production below the high gravity zone.

In the tiny La Honda field in sec. 16, 7s-4w, Ra-Lite Petroleum, Inc. is preparing to spud-in its No. 5.

The Texas Co. Plans Wildcat Near Elwood

The Texas Co. is planning to drill its first Coastal district wildcat in more than two years. The new test well will be locate don the large Bishop lease about a mile and a half northeasterly from the Elwood field on the coast of Santa Barbara county.

Situated north of the State Highway and east of Queen Anne Road, Bishop No. 1 will be carried deep enough to prove the possibilities of the Monterey, Vaqueros, Sespe and, if present, the Eocene formations. Other deep wells in the vicinity have established the presence of the reservoir sands and it only remains for Texas to find a closed structure.

A brief on the constitutionality of the Cole bill, submitted to the House Interstate Commerce Committee by Interior Department Solicitor Margold and just made public, asserts that the "war powers" possessed by Congress under the Constitution would enable the Federal Government to control the oil industry.

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Coastal District

Republic Spuds Hollister Well

Republic Petroleum Co. has spudded its prospect well in the large Hollister ranch at Gaviota and at last reports was drilling near the 1300 ft. level. This latest of several attempts to find production on this property is located on a here-to-fore untested structure east of the group of wells drilled by Western Gulf Oil Co., Gaviota Oil Co. and Wilshire Oil Co. which found non-commercial quantities of gas in Vaqueros. It is not known to what depth the hole will be carried but it is thought that both the Sespe and Eocene formations offer productive possibilities below the Miocene in this area.

Petrol Corp. Extends Gato Ridge Production

Extending Gato Ridge production to the southeast, The Petrol Corp. brought in Tognazzini No. 3-15 flowing 650 bbls. of 13 gravity oil. Though bottomed at 2900 ft., only the upper section of the Monterey is open, the liner being perforated at intervals from 2000 ft. to 2350 ft. below which point it is blank. After this more than satisfactory production test it is possible that the lower portion of the hole will be tested by gun-perforating the liner.

Union Oil Co. Drills Second Pezzoni Well

With the hope that at least it will clear up the somewhat complicated geological picture of the Betteravia section of the Santa Maria Valley, Union Oil Co. is drilling its second well on the Pezzoni property. Now below 1500 ft. in depth, No. 2 is located northeasterly from No. 1 which recently was drilled to the Franciscan schist.

Shiells Canyon Well Pumps 100 Bbls. Daily

Santa Clara Petroleum Co. obtained a 100-bbl. yield in completing its second well on Calumet property in the old Shiells canyon field in Ventura county. Bottomed at 3245 ft., the well, known as Santa Clara No. 1, is open below the 8⅝ in. casing shoe at 2388 ft. Surprisingly, gravity of the oil is only 26 as against 35 gravity claimed for the company's first well. Heavy oil was used as circulating fluid during the drilling of both wells.

In the southerly sector of the Shiells Canyon area, El Rancho Oil Co. is completing Elkins No. 4 after landing a perforated liner on a bottom plug at 3041 ft. Swabbing and bailing is in progress before putting on the pump.

Independents Active In Ventura County

Many independent operators are now active throughout Ventura county with the greatest concentration in the Sespe-Hopper Canyon area. In the latter district J. A. English is below 1000 ft. in his second well while G. E. Development Co., Chas. Gerard, Merchants Petroleum Co. and Rio Hondo Oil Co. all have projects at various stages of development.

Sulphur Springs Oil Co. is still drilling at Conejo and reports a depth in excess of 3850 ft. in Janss No. 1. In the old Ojai field, Coronet Oil Co.'s Coronet No. 1 has been taken over by Van Acker & Havelin who are using oil as circulating fluid in deepening to 2700 ft. In an attempted completion at 2300 ft. by the original operators, the well produced only a little oily mud, the low-pressure sands apparently having been effectively mudded off but since deepening and circulating the lighter fluid, the well has shown more life.

Per-Col Oil Co. has pulled the old liner in Anlauf No. 6 in the Santa Paula field and is preparing to clean out the plug to deepen below 1450 ft.

COASTAL COUNTIES WILDCATS

Area	Well	No.	Section	Depth	Status
Santa Barbara County					
Betteravia	Union Oil Co., Pezzoni	2	33, 10-35	1515	Drilling
Elwood	The Texas Co., Bishop	1	13, 4-29		Location
Gaviota	Republic Pet. Co., Hollister	1	36, 5-33	954	Drilling
Santa Rita Hills	Tidewater Assoc. Oil Co., Souza	1	12, 6-33		Grade
Summerland	Barnato Group, The, Hyland	1	16, 4-26	3100	Drilling
San Luis Obispo County					
Arroyo Grande	California Fuel Oil Co., Elberta	3	5, 32-13	3033	Drilling
Elkhorn	Calif. Pet. Prod., Irons	1	19, 10-24	2527	Rng. rods
Huasna	Superior Oil Co., Tar Springs	1	24, 32-14	2743	Drilling
Ventura County					
Conejo	Sulphur Springs Oil Co., Janss	1	33, 2-19	3995	Drilling
Ojai	Van Acker & Havelin, Coronet	1	17, 4-21	2487	Drilling
Santa Susana	K. C. Oil Co., Marr	1	32, 3-17	1716	Idle
Sespe	English, J. A., Lankershim	3	13, 4-9	847	Drilling
	G. E. Development Co.	7	13, 4-19	920	Drilling
	Gerard, Chas. F., Burson	1	18, 4-19		Rigging up
	Merchants Pet. Co., Cochrane	8	1, 4-20	2387	Drilling
	Rio Hondo Oil Co., Cosby	1	14, 4-19	1550	Drilling

In Short

All federal taxes on petroleum will be increased by the administration's "defense tax" bill. The bill provides for supertaxes of 10 per cent to be added annually for the next five years to taxes on individual and corporation incomes, on income from personal holding companies, on excess profits, on capital stock, and on estates and gifts.

Among the excise taxes to be raised by the "defense tax" bill are: gasoline, to 1½ cents per gallon; lubricating oil, to 4½ cents per gallon; transportation of oil by pipeline, to 4½ per cent of amount of cost of transportation; automobiles, to 3½ per cent, effective July 1.

California Attorney General Earl Warren has advised the State Lands Commission that the city of Huntington Beach does not own the tide or submerged lands on its ocean front. Inclusion of these lands within the city limits, says the attorney general, gives the municipality no proprietary rights thereto.

Announcement has been made by W. S. Farish, president of Standard Oil Co. of New Jersey, of the development of a new type of synthetic rubber, with which his company would be able to supply "any required quantities" to the United States. Mr. Farish stated that the new rubber, which has been named "butyl", is superior to natural rubber for many uses.

Daily average production of crude petroleum in California during April amounted to 613,433 barrels as compared with 602,323 barrels during March, according to the Los Angeles office of the United States Bureau of Mines.

Spokesmen for oil production and refining on June 4 urged the U. S. Wage-Hour Division of the Labor Department to revise its definition of "executive" personnel to exempt many workers.

Formation of Consoco, Inc. Aid to Oil Industry Inventors

The formation of Consoco, Inc. is of great importance to many in the oil industry of California.

There has been a need for an organization of experienced men to pass on the value of ideas and patents with assurance to those having such ideas and patents that sound advice would be given to them, and sound plans for formation and development would be available.

It was with such thoughts in mind that Ross McCollum, Frank Goldman, George E. Johnson, John H. Suter, C. C. Scharpenberg, and Gordon G. MacDonald organized Consoco, Inc.

The qualifications of these six men will be of interest to readers of this publication.

Ross McCollum, president and director, is a graduate of the University of California as chemical engineer. Mr. McCollum was employed by Standard Oil Co. of California as chief chemist in the Production Department, and was later promoted to assistant manager of the Casinghead Gasoline Department, resigning in 1927 to accept a position as manager of the Production Department of Signal Oil & Gas Co. In 1932 Mr. McCollum severed his connections with Signal Oil & Gas Co. to become president of National Oil Co., which position he holds at the present time.

Ross McCollum

George E. Johnson

Frank Goldman

Gordon G. MacDonald

Frank Goldman, vice president and director, is a graduate of the University of California, with a degree in Mining Engineering. Mr. Goldman is secretary and treasurer of Petroleum Supply Co. of Bakersfield, and is in charge of oil drilling operations of this concern.

George E. Johnson, secretary-treasurer, and director, is at the present time Pacific Coast manager of A. O. Smith Corp. He was for a number of years works manager of Fairbanks-Morse & Co. He is one of the organizers of the Johnson Corp., engaged in the manufacture of steam equipment and power plants at Three Rivers, Mich. He is chairman of the board of directors of Perfection Manufacturing Corp., engaged in the business of manufacturing farm and hospital equipment, and is also a director of Sawyer Electrical Manufacturing Co.

John H. Suter, director, is a graduate of Swiss College, Winterthur, Switzerland, with a degree in mechanical engineering. Mr. Suter has held various responsible positions as engineer for several national companies, and until recently, practiced as a consulting engineer in Los Angeles. At the present time Mr. Suter is with Vernon Tool Co., Ltd., as chief engineer.

C. C. Scharpenberg, director, is a civil engineer, holding the degree of Bachelor of Science, Master of Science, and Civil Engineer. Mr. Scharpenberg was with the Standard Oil Co. of California from 1917 to 1938. He retired in 1938 as chief engineer in the Production Department. At the present time Mr. Scharpenberg is vice president of Bakersfield Rock & Gravel Co. He is also a member of the American Society of Civil Engineers, the American Society of Mechanical Engineers, and until resigning from Standard Oil Co. was for over fourteen years vice chairman of the Standardization Committees of the American Petroleum Institute.

Gordon G. MacDonald, director, is an attorney-at-law, specializing in legal matters pertaining to the petroleum industry. He is a graduate of the University of California and of the University of Southern California. Mr. MacDonald is also a retired naval officer.

Consoco, Inc., now holds the patent rights on Co-axial Frequency Changers, a product already favorably known to the aviation industry. The corporation also owns certain other patents developed by the directors.

Axelson Mfg. Opens New Bakersfield Store

A new modern field store for Bakersfield is announced by the Axelson Manufacturing Co. The new store is located at the northwest corner of 28th and "L" streets. It is of stucco construction, measuring 50x70 ft. and is one story in height. The latest type of pump assembly equipment has been installed. Closed shelving protects pump fittings from moisture and dust and an overhead crane facilitates handling of heavy equipment. Stanley Morish will be in charge of the Bakersfield store.

One of the novel features of the store setup is an outdoor washing rack of concrete with power sprayers for cleaning dirt and sludge from pumps and fittings.

The new store involves an investment of approximately $10,000. The building was designed and supervised by Axelson's Los Angeles engineering department.

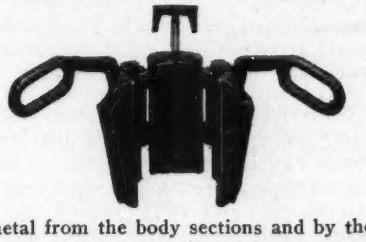
New Baash-Ross Unitized Rotary Slips

Designed to combine extreme lightness for easy handling and full strength with a large safety factor for suspending the longest strings of drill pipe, a new unitized type of rotary slip, designated the Type "C-U," is being introduced by Baash-Ross Tool Co., 5512 Boyle Ave., Los Angeles, Calif.

The Baash-Ross Type "C-U" Rotary Slips consists of 3 heat-treated, alloy steel body sections joined together by means of a unique flexible hinge and equipped with long, readily replaceable liners, and 3 solid steel safety loop handles.

The three body sections are joined together to insure that all will set at the same level in the master bushings when supporting the drill pipe load, in order to eliminate any tendency to crush the pipe. The flexible hinges which join the body sections permit them to become automatically adjusted laterally and vertically as the pipe load is brought to rest, so that the pipe is gripped evenly by the liners.

Increased operating convenience of the new Baash-Ross Type "C-U" Rotary Slips is said to result from the lightness in weight obtained by coring all excess



metal from the body sections and by the correct balance resulting from the location at which the handles are attached to the body sections. The slips stand firmly without tipping when rested on the rotary table when the drill pipe is being run in or pulled out of the hole. The solid steel handles are hinged to the body sections so that they lie flat upon the rotary table out of the way of the elevators and are provided with large, solid steel safety loops to protect the hands of the worker. Type "C-U" Rotary Slips are so designed that one body size accommodates interchangeable liners to fit from 4 to 6 or more different sizes of pipe.

An improved method of retaining the liners in the body sections is employed, according to Baash-Ross Tool Co. Two liners are placed vertically in dovetailed slots on the sides and at the bottom of each body section. The long T-head key, inserted from the top of the body, fits vertically between the liners in the slot in the body and retains them securely in position. While this method insures that the liners cannot become accidentally loosened from the body even though they may be broken, it makes changing of the liners in the field an easily accomplished operation and no special tools are required.

A new bulletin completely describing the Baash-Ross Type "C-U" Rotary Slips is available.

Fluor Corp. Inc. In Expansion

The Fluor Corp., Ltd., 909 E. 59th St., Los Angeles, engineers and constructors to the oil, gas and allied industries, and designers and builders of cooling towers has let the contract for a group of factory buildings at 2500 S. Atlantic Blvd., Los Angeles, to be completed about Aug. 15. All told, the group will contain approximately 44,000 sq. ft. of floor space.

The site for the new Fluor plant is approximately 12½ acres, facing Atlantic Blvd. and Sheila St. It will be served by a spur of the Santa Fe Railroad.

Of the 42,000 sq. ft. involved in the group of new buildings, 10,000 sq. ft. will be devoted to the general offices. This will be a one-story building of frame and stucco construction and will house the executive offices, and offices of the cooling tower division and engineering and construction division of the company.

Three other buildings will house the cooling tower mill and pattern shop with 20,000 sq. ft. of space, the machine shop with 4,000 sq. ft. and the construction equipment warehouse with 10,000 sq. ft. of space. These three buildings are to be of wood frame construction with corrugated iron sidewalls.

In keeping with its extensive use of California Redwood in its line of cooling towers, both atmospheric and mechanical draft, the executive offices will be paneled in Redwood finish. A complete air cooling and warm air circulating system has been installed in the general office building.

The Fluor Corp., Ltd., has been at their present location since January 1927. Officials of the company state that the new plant will be about four times the size of the present one.

Total consideration for land and buildings, it is declared, involves approximately $150,000, exclusive of new equipment.

Voluntary cooperation of the petroleum industry with the United States Government and its agencies in furtherance of national defense was pledged by a resolution of the board of directors of the American Petroleum Institute.

Announcement has been made by the U. S. Tariff Commission that it is making a study of the effect of the reciprocal trade agreements program on the oil industry.

Seal Beach Pump Installation Has 750,000 in.-lb. Torque Gear Rating.

The largest capacity long stroke pumping unit yet developed has been installed in the old Seal Beach oil field. The 64,500-lb. unit was designed and produced by Lufkin Foundry & Machine Co.

The choice of long stroke or short stroke pumping units to solve the greatly varied production problems in California oil fields, is dictated, according to engineers, by well depths and the volumes of fluid which may be lifted economically. Some wells of 8000 to 9000 feet depth are equipped with long stroke units and some with short stroke units, both types of units showing definite limitations. The shorter stroke units with their increased speed have to have twice the number of reversals to get the same plunger travel as the longer stroke units.

The shorter stroke units build up greater peak loads, or unit stresses on the sucker rods due to whipping action caused by rapid reversals. Increasing the length of the stroke provides the required feet travel per minute with fewer reversals and resulting lessening of unit rod stress.

In long stroke pumping the cost is increased considerably over the short stroke installation, and selection of long or short stroke depends upon the productivity index of the well. If a large quantity of fluid must be lifted to make the well commercially profitable even with increased pumping cost, the long stroke unit is indicated. For stripper wells or small producers, or where water troubles are not a problem, the shorter stroke unit will answer the purpose.

Generally speaking, better rod string design has to be made with the long stroke unit in that due to less impulse factors of the slower motion, more weight can be put into the sucker rods on almost any given depth well. Long stroke units as a whole are built for heavier service, consequently, they will eventually be handling sucker rods of 1⅛-in. diameter as the long stroke units are capable of balancing these wells with these heavy strings of rods. While it is true that several 6-ft. stroke units are operating on deep holes in which the wells are equipped with three stages of sucker rods, that is, 1-in., ⅞-in. and ¾-in., the selection of design has to be made on the basis of the lightest possible load as a result of the limitations of the short stroke unit in its stroke length and balance. The short stroke unit relies a lot on the whipping of the rods or the over-travel to get the production. In so doing, very high peak loads are set up momentarily resulting in continual rod fatigue and failures making it impractical.

Part of the failure of long stroke units and long stroke pumping to make greater headway in California has been due to the absence of suitable gear capacity to handle some of the loads that are imposed. Heretofore, a 430,000-in./lb. torque gear unit has been the maximum size available on the Pacific Coast for long stroke pumping. In many cases, the operator has been forced to not only reduce his stroke, but reduce his rod load as well as his fluid load due to excessive torque loading on the gears. The new Lufkin 750,000-in./lb. torque unit was designed and built on the theory that this unit would be suitable to pump any depth well in which sucker rods would be used. Using a maximum unit stress of 35,000 lbs. per sq. in. with an 1⅛-in. rod as a top rod which would give a peak loading of 35,000 lbs. due to the area of an 1⅛-in. rod being .988. From these calculations, you can readily figure why this unit can handle any sucker rod problem. Likewise, from a gear torque angle, a 750,000-in./lb. unit should meet any condition certainly with the ultimate overload not to exceed 10%.

The Lufkin unit was installed to operate a 3" x 2¼" x 14' x 18' D & B rod sectional liner stationary pump on an Axelson top lock. The Axelson rods are 1-in., ⅞-in., and ¾-in., Standard No. 59.

The Lufkin unit, individually powered by a 100 H.P. G.E. electric motor through multiple v-belt drive, has a 750,000-in./lb. torque gear rating, and 35,000 lbs. polish rod rating. Pump hookup is through double wire line on equalizer horsehead. The gear box is 8 ft. long and the length of the complete Lufkin unit is 28 ft.

Originally fitted with hard cast iron liner, the D & B pump now has armor steel liners and chrome plated plunger. It is of the single valve type and is adjusted to operate at 18.5 strokes of 10 feet per minute.

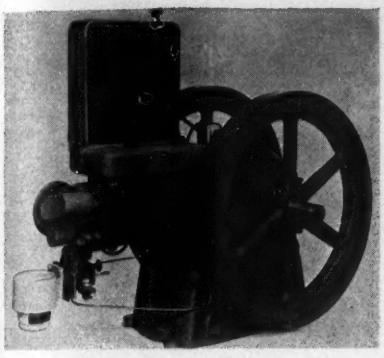
New Axelson Bulletin

The Axelson Manufacturing Co. has prepared a new bulletin describing their Tubing and Rod Types of Full Liners and Full Barrel Tubes. The introduction of these parts to the Axelson line of Deep Well Plunger Pumping Equipment is an outstanding development in improving pump performance and the lowering of initial and maintenance costs. The one-piece internally, case-hardened, precision-honed barrel tubes and liners are said to offer substantial advantages over sectional construction. Both liners and barrel tubes are available in standard lengths and bores and are completely interchangeable with pumps previously requiring an equivalent length of sectional liners.

The new bulletin, which gives a complete description and specifications, is available without cost by writing the Axelson Manufacturing Co., P. O. Box 98, Vernon Station, Los Angeles, Calif.

Fairbanks-Morse Redesigned One Cylinder Oil Field Engines

A completely redesigned line of single cylinder slow speed type "Z" engines available in four sizes with cylinder displacements of 118, 208,346, and 503 cubic inches has been announced by Fairbanks-Morse. This new line. designated as the "ZC" engines, maintains all the



outstanding features which made the old type "Z" engine popular in the oil industry for over a generation, and, in addition, incorporates every worthwhile advantage applicable today, the makers say.

These features include the adaptation of a vapor phase cooling system to the engine, the use of renewable valve seats, oil impregnated bronze bushed valve guides, roller bearings, controlled splash lubrication and internally mounted governor operating in a bath of oil.

Of outstanding importance is the vapor phase cooling system. A condensing radiator is mounted directly on top of the cylinder. Steam generated from the water expands into a special expansion chamber and enters the radiator. Air forced through the radiator by the cooling fan condenses this steam to water which is returned to the system. Thus the temperature of the engine is held absolutely constant regardless of load or outside temperature and without the use of troublesome thermostats or radiator covers. A vent prevents any formation of pressure or vacuum in the radiator.

Two heavy flywheels contribute to the engine's success as an oil well pumping unit. These large flywheels store sufficient energy to carry through the two peaks which occur every stroke and enable the engine to be applied to the average pumping load.

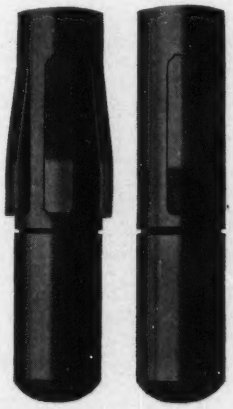
The engine is completely oil tight. The cast iron crankcase cover has unusually large gasket surfaces, and the roller bearings are sealed against oil leakage. In addition, any tendency for oil to leak out is prevented by carrying the crankcase under a slight vacuum through the use of a small breather valve operated by atmospheric pressure.

The enclosed governor permits an extremely wide speed range with very close regulation, and makes for desirable applications to all kinds of service. Piston speeds and rotative speeds are still maintained at a very low level, which insures long life and minimum of maintenance expense. Every part of the engine is readily accessible and its simplicity has been retained so that it can be adjusted or repaired by the operator without expensive mechanical work or having to send the engine to a shop for service.

The Fairbanks-Morse "ZC" engine is available in completely engineered combinations with electric generators, pumps of all types, compressors, etc.

New Regan Casing Centralizer

To definitely center casing and prevent channeling of cement, a device has been developed by Regan. It is a casing centralizer which eliminates weak cement walls and insures a positive water shut-off. Casing leaning against the formation causes a shell-thin wall to be formed by the cement. By use of this



centralizing device the casing assumes a concentric position so that the cement wall is even all around.

This centralizer can be used with the regular cementing procedure. The device consists of a steel body in which six longitudinal slots are included to receive six expandable foot members of drillable alloy metal. This body screws into the bottom of the casing which is to be cemented. A casing shoe is screwed to the bottom. When the cement plug is run through the centralizer body it expands the foot members. The plug is tapered at its lower end in a manner calculated to expand the feet gradually. The upper end of the plug is equipped with a diaphragm which is ruptured by the pressure of the cement after landing at the bottom of the centralizer, to permit flow of cement through the plug. After the plug expands the feet to engage the side wall, it seats itself in the shoe, after which the usual cementing procedure is carried out.

The Regan Casing Centralizer can be obtained for all sizes of casing, for any type of thread or for any size of hole.

A new bulletin featuring the Centralizer may be obtained from Regan Forge & Engineering Co., San Pedro, Calif.

Petroleum Accountants Elect W. A. Russell

W. A. Russell, Seaboard Oil Co., was elected president of the Petroleum Accountants Society at the recent annual meeting of the Society. Other officers elected for the ensuing year are: D. A.

W. A. Russell

Moore, Wilshire Oil Co., first vice president; I. J. Hancock, Union Oil Co. of California, second vice president; N. J. Allen, Lincoln Petroleum Co., secretary-treasurer. Mr. Russell succeeds L. A. Williford, Macmillan Petroleum Corp., who was president of the society during the past 12 months.

Mr. Moore, Mr. Allen, and W .B. Thomson, Kettleman North Dome Association, were re-elected to the society's board of directors, and J. P. Vezzetti, Sunset Oil Co., and H. J. Brown, Shell Oil Co., Inc., were elected to fill vacancies on the board.

Mr. Russell, the new president, graduated from the University of Texas and served in the Navy during the war. He entered the oil business as an accountant with Seaboard Oil Co. in Mexico, and has been with that company in California since 1924.

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ROYALTIES WANTED

For private trust funds. Producing royalties in California oil fields. Submit at once. TRUSTEE, P. O. Box 213, Los Angeles, Calif. 8/20tfb

Utah Tax Commission has rescinded its ruling extending the 4-cent gasoline tax to diesel fuel, following a decision of the Third District Court that the 1939 law on which the commission relied exempted diesel fuels from the tax.

Taxable distribution of motor vehicle fuel in the five Pacific Coast states for the month of April amounted to 219,893,628 gallons, according to figures compiled from state tax reports by the California Oil and Gas Association.

The senate on May 29 passed a bill, S. 2,915, relating to rentals in certain oil leases issued under the authority of the act of February 25, 1920.

MAPS

Large maps of Los Angeles Basin oil fields and map showing all California oil fields. Price $15.00 each on paper and $20 each on cloth. Individual state oil and gas maps of Mid-Continent and Rocky Mountain regions. Maps show geological cross sections at base. These maps indicate wells drilling, wells producing and abandoned, with depths.
All maps revised up to date of purchase.
JAMES C. BRANSFORD
1127 Story Bldg.
Los Angeles, Calif.
Phone: TUcker 7530

Oil Men's Calendar

Calif. Natural Gasoline Association. **Los Angeles Chapter**—Meets 1st Thursday Each Month, Barker Bros. Bldg., Los Angeles—Dinner at 6:00 (Optional). **Taft Chapter**—Meets Third Thursday Each Month.

American Society of Mechanical Engineers—Los Angeles Section—Meets 2nd Thursday Each Month—Barker Bros. Bldg., Los Angeles. Dinner at 6:30 (Optional).

June

24-28—American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J.

July

3-4-5—Northwest Conference of the Pacific Coast Gas Ass'n., Jasper National Park, Alberta, Canada. This meeting is to be held in conjunction with the Annual Convention of the Canadian Gas Association.

September

18-19-20—Annual Convention of the Pacific Coast Gas Ass'n., Hotel Del Coronado, Coronado, Calif.

October

7-12—Annual Convention of American Gas Ass'n., Atlantic City, N. J.

You are reading the Pacific Coast oil men's home paper.

California Crude Oil Production

Two Weeks Ended June 14, 1940

	June Daily Quota	Average Daily Production	Excess
San Joaquin Valley			
Belridge—North	11,251	10,495	*756
Belridge—South	2,146	1,998	*148
Buena Vista	16,198	17,048	850
Canal	5,883	5,950	67
Coalinga-E. (Eocene)	16,441	17,480	1,039
Coalinga—East-West	15,128	10,885	*4 243
Cole's Levee	5,096	5,834	738
Edison	2,242	2,399	157
Elk Hills	6,848	12,471	5,623
Fruitvale	5,692	6,684	992
Greeley	4,339	3,888	*451
Kern Front	7,263	6,326	*937
Kern River	6,843	4,028	*2,815
Kettleman No. Dome	34,854	46,535	11,681
Lost Hills	3,894	3,834	*60
McKittrick	3,766	3,403	*363
Midway	36,673	44,936	8,263
Mount Poso	9,228	10,036	808
Mountain View	7,789	8,564	776
Rio Bravo	8,600	7,945	*656
Round Mt. and Coffee Canyon	6,925	7,172	247
Ten Section	9,481	9,254	*227
Wasco	1,723	1,596	*127
Other Fields	3,751	3,714	*37
TOTAL	232,053	252,475	20,422
Coastal Counties			
Elwood	3,473	3,628	155
Rincon	2,503	3,935	1,432
Santa Maria	5,892	3,262	*2,630
Gato Ridge	2,194	3,530	1,336
Santa Maria Valley	17,287	16,382	*905
Santa Paula	5,997	6,639	642
Ventura Avenue	32,029	33,995	1,966
Other Fields	5,319	5,380	61
TOTAL	74,694	76,751	2,057
Los Angeles Basin			
Alamitos-Seal Beach	7,238	7,997	759
Brea-Olinda	8,073	5,945	*2,128
Coyote—East	3,518	3,992	474
Coyote—West	9,962	6,296	*3,666
Domingues	17,625	22,124	4,499
El Segundo	2,162	2,294	132
Huntington Beach—New and Old	22,596	27,194	4,598
Inglewood	12,063	13,174	1,111
Long Beach	39,413	45,264	5,851
Montebello	5,838	5,107	*731
Montebello-West End	18,173	17,789	*384
Playa del Rey	3,921	4,175	254
Richfield	7,010	9,096	2,086
Rosecrans-Athens	8,317	9,928	1,611
Santa Fe Springs	23,672	26,889	3,217
Torrance	5,136	5,017	*119
Torrance "34" and "D & B"	5,983	6,129	146
Wilmington	79,307	85,536	6,229
Other Fields	4,160	4,432	272
TOTAL	284,167	308,378	24,211
STATE TOTAL	590,914	637,604	46,690

*—Shortage.

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